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United States
Department of
Agriculture



Forest Service

Forest Pest
Management

Davis, CA

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS: 1970-1989

An Annotated Bibliography



FPM 90-11
September 1990

Pesticides used improperly can be injurious to human beings, animals, and plants. Follow the directions and heed all precautions on labels. Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides where there is danger of drift when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment, if specified on the label.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S Environmental Protection Agency, consult your local forest pathologist, county agriculture agent, or State extension specialist to be sure the intended use is still registered.



The use of trade, firm, or corporation names is for information and convenience of the reader. Such use does not constitute an official evaluation, conclusion, recommendation, endorsement, or approval of any product or service to the exclusion of others which may be suitable.

Front Cover - Photographs of a 1978 test in McCall, Idaho to evaluate Marsh Turbo Thrush in mountainous terrain. Bell 206 "Jet Ranger" was selected as standard. Photographs by Bill Ciesla and Jim Kautz.

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FOR SUPPRESSION OF
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An Annotated Bibliography

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Preface

This report was compiled as a result of a recommendation by the National Steering Committee for Aerial Application of Pesticides - Western Defoliators. The Committee identified a need to catalogue all projects that involved control of western defoliators. Data contained herein and the publication and report citations provide a reference for research and operational personnel. The report is a summary of the administrative, operational, and biological aspects of field tests, pilot tests, demonstration projects, and operational projects conducted during the period 1970-1989. All information contained in this report has been entered into a computerized data base which will be updated annually and published in hard copy format. The system software is a group of related files that store information and is manipulated by Data General software. Inputs to the system use two utilities - CEO word processing and Data Tables Utility. Data base manager is Pat Skyler of the Forest Pest Management (W0) office in Davis, CA. For additional information contact her at (916)758-4600 or FTS 460-1715.

INTRODUCTORY PROCEDURES

A request for inclusion of aerial application projects involving aerial spraying will be made annually. This request will be submitted to the Forest Pest Management (W0) office, or to the regional offices and resource managers in regions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11. The regional FPM office will be responsible for soliciting project information from all projects conducted by the Forest Service and other agencies within their area of responsibility.

A project data sheet should be completed for each project and returned to FPM, Davis, CA, in the manner described. An example of the project data sheet has been included in figure 1. The information will be entered into the Data General computer system and updated annually and the project manager will be informed, acknowledged, and mailed to all participating agencies.

INTRODUCTION

PURPOSE

The purpose of this document is to compile an annotated bibliography of published and unpublished aerial insecticide projects which pertain to suppression of western defoliators. Research field tests, pilot tests, and operational suppression projects conducted between 1970 and 1989 have been included. This listing should be of value to researchers, pest management specialists, and land managers who are interested in evaluating results of previous projects.

SUBMITTAL PROCEDURES

A request for submittal of aerial insecticide project summaries will be made annually. This request will be mailed from Forest Pest Management (FPM), Davis, CA, to regional offices and research stations in Regions 1, 2, 3, 4, 5, 6, and 10. Each Regional FPM office will be responsible for submitting project summaries for all projects conducted by the Forest Service and other agencies within their area of responsibility.

A project data sheet should be completed for each project and returned to FPM, Davis, CA, by the requested deadline. An example of the project data sheet has been included on page 4. The information will be entered into the Data General computer system and updated indexes and new project summaries will be printed, duplicated, and mailed to all participating agencies.

FORMAT

Section 1. Section 1 contains a series of indexes which should help the reader sort the information and locate only the project summaries of interest.

Pink Pages. The pink index sorts the project summaries by type of project, either research field project, pilot project, operational project, or other.

Blue Pages. The blue index sorts the project summaries by type of insecticide, either biological, chemical or both. Pheromones have been classified as biological insecticides.

Green Pages. The green index sorts the project summaries by target insect pests. Under the various target pests additional hierarchical sorts have been listed. Each line in the index refers to a specific project which is identified by a discrete index number found in the right-hand column. This number corresponds to the index number found in the upper right-hand corner of the project summary in Section 2. If you are interested in reviewing all of the project summaries dealing with aerial application of biological insecticides for control of western spruce budworm, you could identify these projects in the green index by looking for WSBW in column 1 and biological in column 2. Twenty-one summaries have been identified. The reader could then locate these summaries by the index number in Section 2.

Section 2. Section 2 contains the project summaries. Each project has been assigned a discrete index number which identifies that specific project. The project summaries are in numerical order by this index number which is found in the upper right-hand corner of each summary. The project summaries are designed to give the reader a brief synopsis of the project and its objectives. Publications pertaining to the projects are listed.

Sequence # ____ (For administrative use only)

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ENTRY FORM

Please print or type:

ADMINISTRATION

Lead company or agency _____
Project director _____
Mailing address _____
City, State, ZIP _____

PROJECT LOCATION

Project location _____, _____
_____, _____
(County) _____ (State) _____

Please check all that apply:

TARGET PEST

Western spruce budworm [1] ()
Gypsy moth [2] ()
DF tussock moth [3] ()
Other [4] ()

INSECTICIDE

Biological [1] () Chemical [2] () Both [3] ()

Pesticide name _____

(brand name) _____ (common name) _____

TYPE OF AIRCRAFT

Fixed-wing [1] () Rotary-wing [2] () Both [3] ()

PROJECT DATE

____-____-____
(year only)

TREATED ACRES

Number of treated acres with project boundary: _____. _____. AC

PROJECT CLASSIFICATION

Research field test [1] () Pilot test [2] ()
Demonstration project [3] () Operational project [4] ()
Other [5] ()

TYPE OF APPLICATION

Undiluted [1] () Diluted [2] () Both [3] ()

SPRAY SYSTEM

Rotary atomizers [1] () Hydraulic nozzles [2] () Both [3] ()
Other [4] _____

Project Objectives:

Abstract:

Project Publications and Reports: (Please include a complete reference)

Name and telephone number of person completing this form:

SECTION 1

INDEX BY CLASSIFICATION CODE

CLASSIFICATION	PEST NAME	INSECTICIDE	APPLICATION	YEAR	INDEX NUMBER
Research Field	WSBW	Biological	Diluted	1980	25
Research Field	WSBW	Biological	Diluted	1975	51
Research Field	WSBW	Biological	Diluted	1984	59
Research Field	WSBW	Biological	Both	1987	63
Research Field	WSBW	Biological	Diluted	1989	75
Research Field	WSBW	Biological	Diluted	1993	125
Research Field	WSBW	Chemical	Diluted	1972	3
Research Field	WSBW	Chemical	Diluted	1976	10
Research Field	WSBW	Chemical	Diluted	1977	13
Research Field	WSBW	Chemical	Diluted	1980	55
Research Field	WSBW	Chemical	Diluted	1978	85
Research Field	WSBW	Chemical	Diluted	1979	88
Research Field	WSBW	Chemical	Diluted	1975	89
Research Field	WSBW	Chemical	Diluted	1977	93
Research Field	WSBW	Chemical	Diluted	1979	95
Research Field	WSBW	Chemical	Diluted	1980	96
Research Field	DFTM	Biological	Diluted	1973	44
Research Field	DFTM	Biological	Diluted	1975	78
Research Field	DFTM	Biological	Diluted	1982	97
Research Field	DFTM	Biological	Diluted	1991	107
Research Field	DFTM	Biological	Diluted	1991	120
Research Field	DFTM	Chemical	Diluted	1974	47
Research Field	DFTM	Chemical	Diluted	1975	48
Research Field	DFTM	Chemical	Diluted	1981	82
Research Field	DFTM	Chemical	Both	1975	83
Research Field	DFTM	Chemical	Both	1974	84
Research Field	DFTM	Chemical	Diluted	1972	86
Research Field	DFTM	Chemical	Diluted	1975	90
Research Field	DFTM	Chemical	Diluted	1976	94
Research Field	DFTM	Chemical	Diluted	1973	103
Research Field	Other	Biological	Diluted	1978	79
Research Field	Other	Biological	Diluted	1979	80
Research Field	Other	Biological	Diluted	1980	81
Research Field	Other	Biological	Undiluted	1992	110
Research Field	Other	Chemical	Diluted	1982	29
Research Field	Other	Chemical	Diluted	1979	37
Research Field	Other	Chemical	Diluted	1984	60
Research Field	Other	Chemical	Diluted	1976	91

INDEX BY CLASSIFICATION CODE

CLASSIFICATION	PEST NAME	INSECTICIDE	APPLICATION	YEAR	INDEX NUMBER
Research Field	Other	Chemical	Diluted	1975	92
Research Field	Other	Both	Diluted	1973	5
Pilot	WSBW	Biological	Diluted	1975	8
Pilot	WSBW	Biological	Diluted	1981	16
Pilot	WSBW	Biological	Diluted	1981	26
Pilot	WSBW	Biological	Undiluted	1988	70
Pilot	WSBW	Biological	Undiluted	1988	71
Pilot	WSBW	Biological	Undiluted	1989	76
Pilot	WSBW	Chemical	Diluted	1971	1
Pilot	WSBW	Chemical	Diluted	1975	7
Pilot	WSBW	Chemical	Diluted	1975	9
Pilot	WSBW	Chemical	Diluted	1976	11
Pilot	WSBW	Chemical	Diluted	1977	12
Pilot	WSBW	Chemical	Diluted	1975	50
Pilot	WSBW	Both	Diluted	1983	57
Pilot	DFTM	Biological	Diluted	1985	17
Pilot	DFTM	Biological	Diluted	1978	22
Pilot	DFTM	Biological	Undiluted	1991	119
Pilot	DFTM	Chemical	Diluted	1974	6
Pilot	DFTM	Chemical	Diluted	1973	43
Pilot	DFTM	Chemical	Diluted	1974	45
Pilot	DFTM	Chemical	Both	1974	46
Pilot	Other	Biological	Diluted	1978	14
Pilot	Other	Chemical	Diluted	1981	27
Pilot	Other	Chemical	Diluted	1974	36
Operational	WSBW	Biological	Diluted	1986	19
Operational	WSBW	Biological	Diluted	1984	32
Operational	WSBW	Biological	Diluted	1985	34

INDEX BY CLASSIFICATION CODE

CLASSIFICATION	PEST NAME	INSECTICIDE	APPLICATION	YEAR	INDEX NUMBER
Operational	WSBW	Biological	Diluted	1987	64
Operational	WSBW	Biological	Diluted	1987	65
Operational	WSBW	Biological	Undiluted	1988	67
Operational	WSBW	Biological	Undiluted	1989	73
Operational	WSBW	Biological	Diluted	1986	98
Operational	WSBW	Biological	Undiluted	1987	99
Operational	WSBW	Biological	Undiluted	1990	104
Operational	WSBW	Biological	Undiluted	1992	111
Operational	WSBW	Biological	Undiluted	1992	112
Operational	WSBW	Biological	Undiluted	1992	113
Operational	WSBW	Biological	Undiluted	1992	117
Operational	WSBW	Biological	Undiluted	1992	118
Operational	WSBW	Biological	Undiluted	1993	122
Operational	WSBW	Biological	Diluted	1986	123
Operational	WSBW	Chemical	Diluted	1979	15
Operational	WSBW	Chemical	Diluted	1976	52
Operational	WSBW	Chemical	Diluted	1977	53
Operational	WSBW	Chemical	-	1979	54
Operational	WSBW	Chemical	Diluted	1982	56
Operational	WSBW	Chemical	Diluted	1983	58
Operational	WSBW	Chemical	Diluted	1986	62
Operational	WSBW	Chemical	Diluted	1988	68
Operational	WSBW	Chemical	Diluted	1989	74
Operational	WSBW	Chemical	Diluted	1990	106
Operational	WSBW	Chemical	Diluted	1992	114
Operational	WSBW	Chemical	Diluted	1993	124
Operational	WSBW	Both	Diluted	1982	28
Operational	WSBW	Both	Diluted	1983	30
Operational	WSBW	Both	Diluted	1984	33
Operational	WSBW	Both	Diluted	1988	66
Operational	WSBW	Both	Both	1992	115
Operational	WSBW	Both	Both	1992	116
Operational	GM	Biological	Diluted	1989	35
Operational	GM	Biological	Undiluted	1990	100
Operational	GM	Biological	Diluted	1990	101
Operational	GM	Biological	Diluted	1989	102
Operational	GM	Biological	Diluted	1990	105
Operational	GM	Biological	Undiluted	1991	108
Operational	GM	Biological	Undiluted	1992	121
Operational	GM	Biological	Undiluted	1992	126
Operational	GM	Biological	Undiluted	1993	127

INDEX BY CLASSIFICATION CODE

CLASSIFICATION	PEST NAME	INSECTICIDE	APPLICATION	YEAR	INDEX NUMBER
Operational	DFTM	Biological	Diluted	1986	18
Operational	DFTM	Biological	Diluted	1979	23
Operational	DFTM	Biological	Diluted	1979	24
Operational	DFTM	Biological	Diluted	1989	42
Operational	DFTM	Biological	Undiluted	1991	109
Operational	DFTM	Chemical	Diluted	1974	49
Operational	Other	Biological	Diluted	1980	20
Operational	Other	Biological	Diluted	1985	39
Operational	Other	Chemical	Diluted	1983	31
Operational	Other	Chemical	Diluted	1973	77
Other	WSBW	Biological	Both	1985	61
Other	WSBW	Biological	Undiluted	1988	69
Other	WSBW	Biological	Undiluted	1988	72
Other	WSBW	Chemical	Diluted	1971	2
Other	WSBW	Chemical	Diluted	1972	4
Other	WSBW	Chemical	Diluted	1977	21
Other	GM	Biological	Diluted	1983	87
Other	DFTM	Biological	Both	1988	41
Other	DFTM	Chemical	Diluted	1986	40
Other	Other	Chemical	Diluted	1981	38

INDEX BY INSECTICIDE CODE

INSECTICIDE	PEST NAME	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
Biological	WSBW	Research Field	Diluted	1980	25
Biological	WSBW	Research Field	Diluted	1975	51
Biological	WSBW	Research Field	Diluted	1984	59
Biological	WSBW	Research Field	Both	1987	63
Biological	WSBW	Research Field	Diluted	1989	75
Biological	WSBW	Research Field	Diluted	1993	125
Biological	WSBW	Pilot	Diluted	1975	8
Biological	WSBW	Pilot	Diluted	1981	16
Biological	WSBW	Pilot	Diluted	1981	26
Biological	WSBW	Pilot	Undiluted	1988	70
Biological	WSBW	Pilot	Undiluted	1988	71
Biological	WSBW	Pilot	Undiluted	1989	76
Biological	WSBW	Operational	Diluted	1986	19
Biological	WSBW	Operational	Diluted	1984	32
Biological	WSBW	Operational	Diluted	1985	34
Biological	WSBW	Operational	Diluted	1987	64
Biological	WSBW	Operational	Diluted	1987	65
Biological	WSBW	Operational	Undiluted	1988	67
Biological	WSBW	Operational	Undiluted	1989	73
Biological	WSBW	Operational	Diluted	1986	98
Biological	WSBW	Operational	Undiluted	1987	99
Biological	WSBW	Operational	Undiluted	1990	104
Biological	WSBW	Operational	Undiluted	1992	111
Biological	WSBW	Operational	Undiluted	1992	112
Biological	WSBW	Operational	Undiluted	1992	113
Biological	WSBW	Operational	Undiluted	1992	117
Biological	WSBW	Operational	Undiluted	1992	118
Biological	WSBW	Operational	Undiluted	1993	122
Biological	WSBW	Operational	Diluted	1986	123
Biological	WSBW	Other	Both	1985	61
Biological	WSBW	Other	Undiluted	1988	69
Biological	WSBW	Other	Undiluted	1988	72
Biological	GM	Operational	Diluted	1989	35
Biological	GM	Operational	Undiluted	1990	100
Biological	GM	Operational	Diluted	1990	101
Biological	GM	Operational	Diluted	1989	102
Biological	GM	Operational	Diluted	1990	105
Biological	GM	Operational	Undiluted	1991	108
Biological	GM	Operational	Undiluted	1992	121
Biological	GM	Operational	Undiluted	1992	126
Biological	GM	Operational	Undiluted	1993	127
Biological	GM	Other	Diluted	1983	87

INDEX BY INSECTICIDE CODE

INSECTICIDE	PEST NAME	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
Biological	DFTM	Research Field	Diluted	1973	44
Biological	DFTM	Research Field	Diluted	1975	78
Biological	DFTM	Research Field	Diluted	1982	97
Biological	DFTM	Research Field	Diluted	1991	107
Biological	DFTM	Research Field	Diluted	1991	120
Biological	DFTM	Pilot	Diluted	1985	17
Biological	DFTM	Pilot	Diluted	1978	22
Biological	DFTM	Pilot	Undiluted	1991	119
Biological	DFTM	Operational	Diluted	1986	18
Biological	DFTM	Operational	Diluted	1979	23
Biological	DFTM	Operational	Diluted	1979	24
Biological	DFTM	Operational	Diluted	1989	42
Biological	DFTM	Operational	Undiluted	1991	109
Biological	DFTM	Other	Both	1988	41
Biological	Other	Research Field	Diluted	1978	79
Biological	Other	Research Field	Diluted	1979	80
Biological	Other	Research Field	Diluted	1980	81
Biological	Other	Research Field	Undiluted	1992	110
Biological	Other	Pilot	Diluted	1978	14
Biological	Other	Operational	Diluted	1980	20
Biological	Other	Operational	Diluted	1985	39
Chemical	WSBW	Research Field	Diluted	1972	3
Chemical	WSBW	Research Field	Diluted	1976	10
Chemical	WSBW	Research Field	Diluted	1977	13
Chemical	WSBW	Research Field	Diluted	1980	55
Chemical	WSBW	Research Field	Diluted	1978	85
Chemical	WSBW	Research Field	Diluted	1979	88
Chemical	WSBW	Research Field	Diluted	1975	89
Chemical	WSBW	Research Field	Diluted	1977	93
Chemical	WSBW	Research Field	Diluted	1979	95
Chemical	WSBW	Research Field	Diluted	1980	96
Chemical	WSBW	Pilot	Diluted	1971	1
Chemical	WSBW	Pilot	Diluted	1975	7
Chemical	WSBW	Pilot	Diluted	1975	9
Chemical	WSBW	Pilot	Diluted	1976	11
Chemical	WSBW	Pilot	Diluted	1977	12

INDEX BY INSECTICIDE CODE

INSECTICIDE	PEST NAME	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
Chemical	WSBW	Pilot	Diluted	1975	50
Chemical	WSBW	Operational	Diluted	1979	15
Chemical	WSBW	Operational	Diluted	1976	52
Chemical	WSBW	Operational	Diluted	1977	53
Chemical	WSBW	Operational	~	1979	54
Chemical	WSBW	Operational	Diluted	1982	56
Chemical	WSBW	Operational	Diluted	1983	58
Chemical	WSBW	Operational	Diluted	1986	62
Chemical	WSBW	Operational	Diluted	1988	68
Chemical	WSBW	Operational	Diluted	1989	74
Chemical	WSBW	Operational	Diluted	1990	106
Chemical	WSBW	Operational	Diluted	1992	114
Chemical	WSBW	Operational	Diluted	1993	124
Chemical	WSBW	Other	Diluted	1971	2
Chemical	WSBW	Other	Diluted	1972	4
Chemical	WSBW	Other	Diluted	1977	21
Chemical	DFTM	Research Field	Diluted	1974	47
Chemical	DFTM	Research Field	Diluted	1975	48
Chemical	DFTM	Research Field	Diluted	1981	82
Chemical	DFTM	Research Field	Both	1975	83
Chemical	DFTM	Research Field	Both	1974	84
Chemical	DFTM	Research Field	Diluted	1972	86
Chemical	DFTM	Research Field	Diluted	1975	90
Chemical	DFTM	Research Field	Diluted	1976	94
Chemical	DFTM	Research Field	Diluted	1973	103
Chemical	DFTM	Pilot	Diluted	1974	6
Chemical	DFTM	Pilot	Diluted	1973	43
Chemical	DFTM	Pilot	Diluted	1974	45
Chemical	DFTM	Pilot	Both	1974	46
Chemical	DFTM	Operational	Diluted	1974	49
Chemical	DFTM	Other	Diluted	1986	40
Chemical	Other	Research Field	Diluted	1982	29
Chemical	Other	Research Field	Diluted	1979	37
Chemical	Other	Research Field	Diluted	1984	60
Chemical	Other	Research Field	Diluted	1976	91
Chemical	Other	Research Field	Diluted	1975	92
Chemical	Other	Pilot	Diluted	1981	27
Chemical	Other	Pilot	Diluted	1974	36

INDEX BY INSECTICIDE CODE

INSECTICIDE	PEST NAME	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
Chemical	Other	Operational	Diluted	1983	31
Chemical	Other	Operational	Diluted	1973	77
Chemical	Other	Other	Diluted	1981	38
Both	WSBW	Pilot	Diluted	1983	57
Both	WSBW	Operational	Diluted	1982	28
Both	WSBW	Operational	Diluted	1983	30
Both	WSBW	Operational	Diluted	1984	33
Both	WSBW	Operational	Diluted	1988	66
Both	WSBW	Operational	Both	1992	115
Both	WSBW	Operational	Both	1992	116
Both	Other	Research Field	Diluted	1973	5

INDEX BY PEST CODE

PEST NAME	INSECTICIDE	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
WSBW	Biological	Research Field	Diluted	1980	25
WSBW	Biological	Research Field	Diluted	1975	51
WSBW	Biological	Research Field	Diluted	1984	59
WSBW	Biological	Research Field	Both	1987	63
WSBW	Biological	Research Field	Diluted	1989	75
WSBW	Biological	Research Field	Diluted	1993	125
WSBW	Biological	Pilot	Diluted	1975	8
WSBW	Biological	Pilot	Diluted	1981	16
WSBW	Biological	Pilot	Diluted	1981	26
WSBW	Biological	Pilot	Undiluted	1988	70
WSBW	Biological	Pilot	Undiluted	1988	71
WSBW	Biological	Pilot	Undiluted	1989	76
WSBW	Biological	Operational	Diluted	1986	19
WSBW	Biological	Operational	Diluted	1984	32
WSBW	Biological	Operational	Diluted	1985	34
WSBW	Biological	Operational	Diluted	1987	64
WSBW	Biological	Operational	Diluted	1987	65
WSBW	Biological	Operational	Undiluted	1988	67
WSBW	Biological	Operational	Undiluted	1989	73
WSBW	Biological	Operational	Diluted	1986	98
WSBW	Biological	Operational	Undiluted	1987	99
WSBW	Biological	Operational	Undiluted	1990	104
WSBW	Biological	Operational	Undiluted	1992	111
WSBW	Biological	Operational	Undiluted	1992	112
WSBW	Biological	Operational	Undiluted	1992	113
WSBW	Biological	Operational	Undiluted	1992	117
WSBW	Biological	Operational	Undiluted	1992	118
WSBW	Biological	Operational	Undiluted	1993	122
WSBW	Biological	Operational	Diluted	1986	123
WSBW	Biological	Other	Both	1985	61
WSBW	Biological	Other	Undiluted	1988	69
WSBW	Biological	Other	Undiluted	1988	72
WSBW	Chemical	Research Field	Diluted	1972	3
WSBW	Chemical	Research Field	Diluted	1976	10
WSBW	Chemical	Research Field	Diluted	1977	13
WSBW	Chemical	Research Field	Diluted	1980	55
WSBW	Chemical	Research Field	Diluted	1978	85
WSBW	Chemical	Research Field	Diluted	1979	88
WSBW	Chemical	Research Field	Diluted	1975	89
WSBW	Chemical	Research Field	Diluted	1977	93
WSBW	Chemical	Research Field	Diluted	1979	95
WSBW	Chemical	Research Field	Diluted	1980	96
WSBW	Chemical	Pilot	Diluted	1971	1
WSBW	Chemical	Pilot	Diluted	1975	7

INDEX BY PEST CODE

PEST NAME	INSECTICIDE	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
WSBW	Chemical	Pilot	Diluted	1975	9
WSBW	Chemical	Pilot	Diluted	1976	11
WSBW	Chemical	Pilot	Diluted	1977	12
WSBW	Chemical	Pilot	Diluted	1975	50
WSBW	Chemical	Operational	Diluted	1979	15
WSBW	Chemical	Operational	Diluted	1976	52
WSBW	Chemical	Operational	Diluted	1977	53
WSBW	Chemical	Operational	-	1979	54
WSBW	Chemical	Operational	Diluted	1982	56
WSBW	Chemical	Operational	Diluted	1983	58
WSBW	Chemical	Operational	Diluted	1986	62
WSBW	Chemical	Operational	Diluted	1988	68
WSBW	Chemical	Operational	Diluted	1989	74
WSBW	Chemical	Operational	Diluted	1990	106
WSBW	Chemical	Operational	Diluted	1992	114
WSBW	Chemical	Operational	Diluted	1993	124
WSBW	Chemical	Other	Diluted	1971	2
WSBW	Chemical	Other	Diluted	1972	4
WSBW	Chemical	Other	Diluted	1977	21
WSBW	Both	Pilot	Diluted	1983	57
WSBW	Both	Operational	Diluted	1982	28
WSBW	Both	Operational	Diluted	1983	30
WSBW	Both	Operational	Diluted	1984	33
WSBW	Both	Operational	Diluted	1988	66
WSBW	Both	Operational	Both	1992	115
WSBW	Both	Operational	Both	1992	116
GM	Biological	Operational	Diluted	1989	35
GM	Biological	Operational	Undiluted	1990	100
GM	Biological	Operational	Diluted	1990	101
GM	Biological	Operational	Diluted	1989	102
GM	Biological	Operational	Diluted	1990	105
GM	Biological	Operational	Undiluted	1991	108
GM	Biological	Operational	Undiluted	1992	121
GM	Biological	Operational	Undiluted	1992	126
GM	Biological	Operational	Undiluted	1993	127
GM	Biological	Other	Diluted	1983	87
DFTM	Biological	Research Field	Diluted	1973	44
DFTM	Biological	Research Field	Diluted	1975	78

INDEX BY PEST CODE

PEST NAME	INSECTICIDE	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
DFTM	Biological	Research Field	Diluted	1982	97
DFTM	Biological	Research Field	Diluted	1991	107
DFTM	Biological	Research Field	Diluted	1991	120
DFTM	Biological	Pilot	Diluted	1985	17
DFTM	Biological	Pilot	Diluted	1978	22
DFTM	Biological	Pilot	Undiluted	1991	119
DFTM	Biological	Operational	Diluted	1986	18
DFTM	Biological	Operational	Diluted	1979	23
DFTM	Biological	Operational	Diluted	1979	24
DFTM	Biological	Operational	Diluted	1989	42
DFTM	Biological	Operational	Undiluted	1991	109
DFTM	Biological	Other	Both	1988	41
DFTM	Chemical	Research Field	Diluted	1974	47
DFTM	Chemical	Research Field	Diluted	1975	48
DFTM	Chemical	Research Field	Diluted	1981	82
DFTM	Chemical	Research Field	Both	1975	83
DFTM	Chemical	Research Field	Both	1974	84
DFTM	Chemical	Research Field	Diluted	1972	86
DFTM	Chemical	Research Field	Diluted	1975	90
DFTM	Chemical	Research Field	Diluted	1976	94
DFTM	Chemical	Research Field	Diluted	1973	103
DFTM	Chemical	Pilot	Diluted	1974	6
DFTM	Chemical	Pilot	Diluted	1973	43
DFTM	Chemical	Pilot	Diluted	1974	45
DFTM	Chemical	Pilot	Both	1974	46
DFTM	Chemical	Operational	Diluted	1974	49
DFTM	Chemical	Other	Diluted	1986	40
Other	Biological	Research Field	Diluted	1978	79
Other	Biological	Research Field	Diluted	1979	80
Other	Biological	Research Field	Diluted	1980	81
Other	Biological	Research Field	Undiluted	1992	110
Other	Biological	Pilot	Diluted	1978	14
Other	Biological	Operational	Diluted	1980	20
Other	Biological	Operational	Diluted	1985	39
Other	Chemical	Research Field	Diluted	1982	29

INDEX BY PEST CODE

PEST NAME	INSECTICIDE	CLASSIFICATION	APPLICATION	YEAR	INDEX NUMBER
Other	Chemical	Research Field	Diluted	1979	37
Other	Chemical	Research Field	Diluted	1984	60
Other	Chemical	Research Field	Diluted	1976	91
Other	Chemical	Research Field	Diluted	1975	92
Other	Chemical	Pilot	Diluted	1981	27
Other	Chemical	Pilot	Diluted	1974	36
Other	Chemical	Operational	Diluted	1983	31
Other	Chemical	Operational	Diluted	1973	77
Other	Chemical	Other	Diluted	1981	38
Other	Both	Research Field	Diluted	1973	5

SECTION 2

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Wm. Ciesla
 Mailing Address:

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Grangeville (town) ID
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Zectran FS-15	Mexacarbate
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 8,102 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1971 (year)

TYPE OF AIRCRAFT

Fixed-wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

1. Test the strategy of applying registered Zectran FS-15 to protect resource values on relatively small areas until natural factors suppress surrounding budworm infestations. 2. Test the effectiveness of registered Zectran FS-15 in reducing budworm populations in mixed stands of true firs and Douglas-fir, rather than on the pure Douglas-fir stands previously tested. 3. Evaluate the effect of registered Zectran FS-15 on budworm parasites.

Abstract:

In 1971 a pilot test was conducted in Idaho on the Nezperce National Forest and State of Idaho lands to determine the effectiveness of Zectran FS-15 on western spruce budworm and budworm parasites. Two C-47's equipped with 8015 TeeJet nozzles were used to apply the formulation to 8,102 acres.

Project Publications and Reports:

Anonymous. 1972. Analysis of the 1971 spruce budworm pilot test, Nezperce National Forest, Idaho, October 19-20, 1971. USDA Forest Service, Div. State and Private Forestry, Missoula, MT.

Ciesla, W.M., J.E. Dewey, and M.D. McGregor. 1971. Work plan - pilot test of western spruce budworm control strategy in the mixed conifer forests of Region 1 using registered formulation of Zectran, Nezperce National Forest, Idaho. USDA Forest Service, Forest Insect and Disease Branch, Region 1, Missoula, MT.

Dewey, J.E., W.M. Ciesla, and M.D. McGregor. 1971. The 1971 western spruce budworm pilot test - Nezperce National Forest and Idaho State lands. USDA Forest Service, Northern Region, Div. State and Private Forestry, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Robert B. Ekblad
 Mailing Address: USDA Forest Service
 Missoula Tech. Dev. Ctr.
 Ft. Missoula, Bldg. #1
 Missoula, Mt. 59801

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Missoula (town)	MT
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Zectran FS-15 dry liquid Mexacarbate	
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 10

TYPE OF APPLICATION

Diluted

PROJECT DATES

1971 (year)

TYPE OF AIRCRAFT

Fixed-wing

PROJECT CLASSIFICATION

Other - Feasibility Study

SPRAY SYSTEM

Other - Agricultural Spreader

Project Objectives:

The objective of this experiment was to ascertain the feasibility of employing Zectran FS-15 dry liquid carrier dust by aerial application from a standard agricultural spreader.

Abstract:

In June 1971 the USDA Forest Service in cooperation with the U.S. Army Deseret Test Center jointly conducted a test on the Nezperce National Forest, Idaho to demonstrate the feasibility of controlling western spruce budworm by disseminating a dry-liquid insecticide (FS-15 Zectran + Micro-Cel E) from a Cessna Agwagon 300 equipped with a Transland Swathmaster Spreader.

Project Publications and Reports:

Barry, J.W. and G.M. Blake. 1972. Technical Note - Feasibility study of a dry-liquid insecticide employed in a coniferous forested environment. DPG Document No. DTC-TN-70-10-(III). U.S. Army Dugway Proving Ground, Dugway, UT.

Barry, J.W., M. Tysowsky, Jr., R.B. Ekblad, and W.M. Ciesla. 1974. Carrier dusts - feasibility for forest insect control. Transactions of the ASAE (Vol. 17, No. 4, pp. 645-650).

Ekblad, R. and F. Burbank. 1973. Application of "dry-liquids" to insecticide dissemination. PNW 73-101. USDA Forest Service, Equipment Development Center, Missoula, MT.

Waldron, Jr., A.W. 1975. An engineering approach to the problem of maximizing Zectran particle capture on spruce budworms in a dense coniferous forest - technical note. DPG Document No. DPG-TN-M605P. U.S. Army Dugway Proving Ground, Dugway, UT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: *
 Mailing Address: USDA Forest Service
 Federal Building
 P.O. Box 7669
 Missoula, MT 59807

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Lolo NF	MT
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	Pesticide Name	
Zectran FS-15	Mexacarbate	
*	*	
*	*	
(brand name)	(common name)	

Number of treated acres within project boundary:
 3,000 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1972 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Specialized - USAF Modular Internal Spray System

Project Objectives:

To determine the feasibility of the USAF PWU-5/A Modular Internal Spray System (MISS) for aerial dissemination of insecticide aerosols.

Abstract:

In 1972 the USDA Forest Service (FS) in cooperation with the U.S. Army, Deseret Test Center (DTC) conducted a research field test to obtain aerial spray data on the USAF PWU-5/A Modular Internal Spray System (MISS). A standard USDA FS spray system was characterized to serve as a baseline, and to satisfy the licensing requirements for the insecticide Zectran which was used in the MISS. Both systems were installed in C-47 aircraft. Six trials were conducted on the Horizontal Grid at Dugway Proving Ground, Utah, three with the FS system and three with the MISS. An operational trial was conducted on the Lolo National Forest in Montana to demonstrate the effectiveness of the MISS and to obtain data on the filtration effects of coniferous trees on particulate sprays. A malfunction of the MISS pump main bearing necessitated termination of the spray operation before the entire 3,000 acre target area had been sprayed. Spruce budworm larvae were employed to demonstrate the system effectiveness and to study correlations between percent mortality of larvae and contamination densities. Data from the Montana trial indicated that fewer of the larger droplets (greater than 109 microns) reached the ground samplers than the smaller droplets (65 to 109 microns), resulting in a significant reduction in the total mass deposited on the forest floor. An excellent correlation was obtained between the values predicted by the DTC modified mathematical model for spray operations on open terrain. Additional testing was recommended to improve operational procedures and to define problems associated with meteorological and particulate cloud behavior in complex mountainous terrain.

Project Publications and Reports:

Taylor, W.T., W.C. McIntyre, J.W. Barry, H.S. Sloane, and G.L. Sutton. 1972. Services developmental test PWU-5/A USAF modular internal spray system - Final Report. DTC Project No. DTC-FR-73-317. Deseret Test Center, Fort Douglas, UT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Robert B. Ekblad
 Mailing Address: USDA Forest Service
 Missoula Tech. Dev. Center
 Ft. Missoula, Bldg. #1
 Missoula, MT 59801

PROJECT LOCATION

Project Location:	Missoula	MT
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 2 AC

PROJECT DATES

1972 (year)

PROJECT CLASSIFICATION

Other - Feasibility Study

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Zectran FS-15 dry-liquid Mexacarbate	
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Other - Duster

Project Objectives:

To investigate the impaction of dry-liquid particles on the western spruce budworm larvae as a function of particle size.

Abstract:

The USDA Forest Service, supported by the U.S. Army Deseret Test Center, conducted a field test during June 1972 in the Lolo National Forest, Montana to investigate the impaction of dry-liquid Zectran particles on the western spruce budworm larvae as a function of particle size. A Bell G-3 helicopter equipped with a duster was used as the dissemination vehicle. Two plots each 200 x 300 feet were treated.

Project Publications and Reports:

Barry, J.W., M. Tysowsky, Jr., G.F. Orr, R.B. Ekblad, R.L. Marsalis, and W.M. Ciesla. 1973. A field experiment on the impaction of Zectran particles on spruce budworm larvae - Technical Report. DTC Project No. DTC-TR-73-545, USFS MEDC Project No. 2034. Deseret Test Center, Fort Douglas, UT; USDA Forest Service, Region 1, Div. State and Private Forestry; and USDA Forest Service, Missoula Equipment Development Center, Missoula, MT.

Ekblad, R. and F. Burbank. 1973. Application of "dry liquids" to insecticide dissemination. PNW 73-101. USDA Forest Service, Equipment Development Center, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Wm. M. Ciesla
 Mailing Address:

TARGET PEST

Other - Pine Butterfly

PROJECT LOCATION

Project Location:	Ravalli	MT
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Both	
Pesticide Name	
Zectran	Mexacarbate
Dipel WP	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 480 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1973 (year)

TYPE OF AIRCRAFT

Rotary-wing

PROJECT CLASSIFICATION

Research field test

SPRAY SYSTEM

hydraulic nozzles

Project Objectives:

Field experiment to develop alternative control methods to DDT for the control of pine butterfly.

Abstract:

In June 1973 the USDA Forest Service, supported by the U.S. Army Deseret Test Center, conducted a field experiment on the Bitterroot National Forest and adjacent State and private lands in Montana to develop alternative control methods to DDT for the control of pine butterfly. Mexacarbate and Bacillus thuringiensis were applied to 480 acres (12 40-acre plots) using two Bell 47G-3 helicopters.

Project Publications and Reports:

Anonymous. 1973. Preliminary data, pine butterfly field experiment, Bitterroot National Forest. USDA Forest Service, Northern Region, Division of State and Private Forestry, Missoula, MT.

Barry, J.W., G.L. Sutton, B.S. Grim, R.B. Ekblad, W.M. Ciesla, and J.E. Dewey. 1975. Aerial spray evaluation, pine butterfly test, Bitterroot National Forest, Montana, 1973. DPG Document No. DPG-DR-C620A. U.S. Army Dugway Proving Ground, Dugway, UT; USDA Forest Service, Region 1, Division of State and Private Forestry; and USDA Forest Service, Missoula Equipment Development Center, Missoula, MT.

Dewey, J.E. 1973. USDA Environmental Analysis - Field testing of candidate insecticides for control of the pine butterfly. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Dewey, J.E., M.D. McGregor, R.L. Marsalis, J.W. Barry, C.B. Williams, and W.M. Ciesla. 1974. Mexacarbate and Bacillus thuringiensis for control of pine butterfly infestations - Bitterroot National Forest, Montana...1973. Report No. 74-10. USDA Forest Service, Northern Region, Div. of State and Private Forestry, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Wm. M. Ciesla
 Mailing Address: *

*
 *
 *
 *

PROJECT LOCATION

Project Location:	Missoula	MT
	Latah	ID
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 2,200 AC

PROJECT DATES

1974 (year)

PROJECT CLASSIFICATION

Pilot test

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Chemical	
Pesticide Name	Carbaryl
Sevin 4-Oil	*
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

hydraulic nozzles

Project Objectives:

Evaluate efficacy, under field conditions, of a higher dosage of carbaryl against Douglas-fir tussock moth.

Abstract:

In 1974 a pilot project was conducted by the USDA Forest Service in western Montana and northern Idaho to evaluate efficacy, under field conditions, of a higher dosage (2 lb a.i./0.75 gal of carrier/acre) of carbaryl against Douglas-fir tussock moth. Application in Montana was by a Bell 47GB-1 helicopter equipped with T8002 flat fan spray tips. Application in Idaho was by a Bell 205 helicopter equipped with T8010 flat fan spray tips. In Montana, two blocks, each approximately 400 acres, were treated. In Idaho, two blocks, each approximately 700 acres, were treated.

Project Publications and Reports:

Ciesla, W.M. Pilot control projects of chemical and microbial insecticides against Douglas-fir tussock moth - 1974. U.S. Forest Service, Missoula, MT.

Ciesla, W.M., S. Kohler, J.E. Dewey, and M.D. McGregor. 1976. Field efficacy of aerial applications of carbaryl against Douglas-fir tussock moth. J. Econ. Entomology, Vol. 69, No. 2, pp. 219-224.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Wm. M. Ciesla
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location:	Madison	MT
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 3,792 AC

PROJECT DATES

1975 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Dylox 4	Trichlorfon
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To measure the effect of an aerial application of trichlorfon in reducing budworm populations. To measure effect of treatment in protecting foliage. To measure effect of treatments on the incidence of budworm parasitism. To identify and resolve problems in formulation and application associated with operational use.

Abstract:

In 1975 a pilot test was conducted by the USDA Forest Service (with meteorological and spray assessment support provided by U.S. Army, Dugway Proving Ground) on the Beaverhead National Forest, Montana, to evaluate the effectiveness of Dylox 4 against populations of western spruce budworm. The treatment was applied to 3,792 acres using a Bell 205-A helicopter equipped with 8010 flat fan nozzles.

Project Publications and Reports:

Anonymous. 1976 Preliminary report - 1975 western spruce budworm pilot project, Dylox^R 4. U.S. Forest Service, Region 1, Missoula, MT.

Barry, J.W. and R. Ekblad. 1975. Action plan for meteorological and spray assessment support of pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forest, Montana.

Dewey, J. 1975. Pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forests, Montana, 1975. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Flavell, T.H., S. Tunnock, J.W. Barry, R.B. Ekblad, and W.M. Ciesla. 1978. Western spruce budworm - A pilot control project with carbaryl and trichlorfon, 1975 - environmental monitoring of aquatic organisms, birds, and insect pollinators. Report No. 78-5. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Pierce, D.A. 1976. Critique, 1975 western spruce budworm pilot projects - R-1, November 20-21, 1975. USDA Forest Service, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
Agency: Northern Region
Project Director: Wm. M. Ciesla
Mailing Address: *
*
*
*

PROJECT LOCATION

Project Location: Gallatin • MT.
* *
* *
(County) (State)

Number of treated acres within project boundary:
3,300 AC

PROJECT DATES 1975 (year)

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel WP
*
*
(brand name)

Bacillus thuringiensis
*
*
(common name)

TYPE OF APPLICATION

Diluted

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Evaluate effectiveness of an aerial application of Dipel in reducing western spruce budworm populations under operational conditions. Measure effect of treatment in protecting foliage, both the year of treatment and the following year. Identify and resolve problems in formulation and application of large volumes. Determine effect of treatment on western spruce budworm parasites.

Abstracts

In 1975 a pilot project was conducted by the USDA Forest Service on the Gallatin National Forest, Montana. Dipel wettable powder was applied by helicopter equipped with 8015 nozzles to three blocks of Douglas-fir and Engelmann spruce infested with western spruce budworm.

Project Publications and Reports:

Anonymous. 1975. Safety plan - Western spruce budworm BT pilot project.

Barry, J.W. and R. Ekblad. 1975. Action plan for meteorological and spray assessment support of pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forest, Montana.

Bousfield, W. and T. Flavell. 1980. Effects of Dipel^R wettable powder for foliage protection against western spruce budworm 1 and 2 years following aerial application. Report No. 80-9. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Dewey, J. 1975. Pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forests, Montana, 1975. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

McGregor, M.D., D.R. Hamel, and R.C. Lood. 1976. Dipel^R WP (Bacillus thuringiensis Berliner) as a control agent for western spruce budworm. Choristoneura occidentalis Free. Report No. 76-11. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Pierce, D.A. 1976. Critique, 1975 western spruce budworm pilot projects - R-1, November 20-21, 1975.
USDA Forest Service, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Wm. M. Ciesla
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Madison MT.
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical	Pesticide Name	
	Sevin 4-Oil	Carbaryl
*	*	*
*	*	*
	(brand name)	(common name)

Number of treated acres within project boundary:
 3,487 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To measure the effect of an aerial application of carbaryl in reducing budworm populations. To measure effect of treatment in protecting foliage. To measure effect of treatments on the incidence of budworm parasitism. To identify and resolve problems in formulation and application associated with operational use.

Abstract:

In 1975 the USDA Forest Service conducted a western spruce budworm pilot project on the Beaverhead National Forest, Montana. Application of Sevin 4-oil diluted 1:1 with fuel oil was applied by a Bell 205-A helicopter equipped with 8010 flat fan nozzles.

Project Publications and Reports:

Anonymous. 1975. Preliminary report - 1975 western spruce budworm pilot project, Sevin 4-oil. U.S. Forest Service, Region 1, Missoula, MT.

Barry, J.W. and R. Ekblad. 1975. Action plan for meteorological and spray assessment support of pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forest, Montana.

Dewey, J. 1975. Pilot control project of carbaryl, trichlorfon, and Bacillus thuringiensis against western spruce budworm, Beaverhead and Gallatin National Forests, Montana, 1975. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Flavell, T.H., S. Tunnoch, J.W. Barry, R.B. Ekblad, and W.M. Ciesla. 1978. Western spruce budworm - A pilot control project with carbaryl and trichlorfon, 1975 - environmental monitoring of aquatic organisms, birds, and insect pollinators. Report No. 78-5. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Pierce, D.A. 1976. Critique, 1975 western spruce budworm pilot projects - R-1, November 20-21, 1975. USDA Forest Service, Missoula, MT.

Scuderi, J.A., J.A. Boegler, B.M. Earlewine, F.L. Moon, J.W. Barry, R.B. Ekblad, and W.M. Ciesla. 1975. Meteorological data supplement, 1975 spruce budworm pilot test, Gallatin and Beaverhead National Forests - Data Report. DPG Doc. No. DPG-DR-C630A. U.S. Army Dugway Proving Ground, Dugway, UT and USDA Forest Service, Missoula Equipment Development Center, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific SW Station
 Project Director: George Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St. Rm 323
 Honolulu, HI 96813

PROJECT LOCATION

Project Location:	Fremont	ID
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 900 AC

PROJECT DATES

1976 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene 75S	Acephate
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To determine the lowest effective rate of acephate which could be used on a large scale western spruce budworm suppression project.

Abstract:

Acephate (Orthene^R 75S) was field tested against a low population of the western spruce budworm, Choristoneura occidentalis Freeman, in the Targhee National Forest of southwestern Idaho, July 1976. Application was by helicopter using three Beecomist atomizers equipped with wettable powder sleeves to about 100-acre plots when the insects were in 4th and 5th instar. Dosages of 1 lb, 1/2 lb, and 1/4 lb a.i./gal/acre resulted in 98.8, 93.0, and 73.5 percent mortality (check mortality 48.3 percent).

Project Publications and Reports:

Markin, G.P. 1979. Effects of acephate sprayed on western spruce budworm in Idaho, 1976. J. Econ. Entomol. 72:414-415.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Tom Favell
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location:	Broadwater	MT
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 6,108 AC

PROJECT DATES

1976 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Dylox 4	Trichlorfon
Orthene 75-S	Acephate
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To determine efficacy of trichlorfon and acephate for use against western spruce budworm under operational conditions for population reduction. To determine the level of current year foliage protection when pesticides are applied under a population reduction strategy. To identify and resolve formulation, handling, application, and safety problems associated with the use of these pesticides on an operational scale. To determine effect of these pesticides on aquatic invertebrates and fish when used operationally. To determine the effect of Orthene on parasites of the western spruce budworm.

Abstract:

A pilot project to evaluate trichlorfon and acephate for suppressing western spruce budworm populations was conducted in 1976 on the Townsend and Canyon Ferry Ranger Districts on the Helena National Forest, Montana. The formulations were applied to 6,108 acres using a Bell 205 helicopter equipped with Beeconomist rotary atomizers.

Project Publications and Reports:

Barry, J.W., W.M. Ciesla, R. Luebbe, L. Whitcombe, and R.W. Young. 1976. Data Report - Spray deposit summary northern region, 1976 pilot project to evaluate Dylox and Orthene for controlling western spruce budworm. USDA Forest Service, Forest Insect and Disease Management, Methods Application Group, Davis, CA.

Flavell, T.H., S. Tunnock, and W. Bousfield. 1976. Pilot project to evaluate Dylox and Orthene for controlling western spruce budworm: Work plan. USDA Forest Service, Missoula, MT.

Flavell, T.H., S. Tunnock, and H.E. Meyer. 1977. A pilot project evaluating trichlorfon and acephate for managing western spruce budworm, Helena National Forest - 1976. Report No. 77-16. USDA Forest Service, Northern Region, State and Private Forestry, Forest Insect and Disease Management, Missoula, MT.

Jasumback, A.E. 1977. Spray system and ground handling equipment, 1976 Helena National Forest spray project, Townsend, Montana. Special Report No. 7734 2806. USDA Forest Service, Equipment Development Center, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Intermountain Region
 Project Director: Ladd Livingston
 Mailing Address: State of Idaho
 Dept. of Public Lands
 P.O. Box 670
 Coeur D'Alene, ID 83814

PROJECT LOCATION

Project Location:	Valley	ID
	Adams	ID
*	*	*
	(County)	(State)

Number of treated acres within project boundary:
 4,000 AC

PROJECT DATES

1977 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene 75S	Acephate
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To compare the operational efficacy of Orthene applied at 1/2 lb a.i./acre with results of past Orthene field tests. To identify operational problems associated with using Orthene. To determine the unit cost of operational use of Orthene applied at 1/2 lb/acre. To reduce the population of western spruce budworm in treated areas by 95 percent and have a residual population of no more than 5 larvae/100 buds.

Abstract:

In cooperation with the State of Idaho and the Boise Cascade Corp., Region 4 of the USDA Forest Service conducted a pilot control project in central Idaho to determine the effectiveness of Orthene applied at 1/2 lb a.i./acre when used under operational conditions against the western spruce budworm. A Bell 206 helicopter equipped with 40 flat fan TeeJet nozzles was used to spray 4,000 acres.

Project Publications and Reports:

Stipe, L.E., J.A.E. Knopf, R.L. Livingston, R.W. Young, and G.P. Markin. 1979. A pilot project with Orthene for control of the western spruce budworm. McCall, Idaho 1977. USDA Forest Service, Intermountain Region, Ogden, UT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George Markin
 Mailing Address: Inst. of Pac. Islands Fstry
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813
 *

PROJECT LOCATION

Project Location:	Adams	ID
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 900 AC

PROJECT DATES

1977 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	Pesticide Name	
	Reldan (Dowco 214)	Chlorpyrifos-Methyl
*	*	*
*	*	*
	(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To evaluate Reldan at three dosage rates to determine its effectiveness in controlling western spruce budworm.

Abstract:

The chemical Reldan was field tested against an outbreak population of western spruce budworm in grand fir in the Payette National Forest near New Meadows, Idaho. Reldan mixed with diesel fuel was applied by helicopter. Dosage rates of 8 oz, 4 oz, and 2 oz a.i./gal applied at 1 gal/acre resulted in unadjusted mean population reductions of 90.2, 88.3, and 63.4 percent at 15 days post-treatment. The degree of control obtained using Reldan was considerably below that routinely obtained with Sevin 4-oil and Orthene; therefore, Reldan was not considered for further testing.

Project Publications and Reports:

Markin, G.P. and D.G. Grimble. 1977. Field test of the insecticide Reldan against the western spruce budworm in the Payette National Forest, Idaho. Final Report PSW.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION		TARGET PEST
Lead Company or Agency:	USDA Forest Service Northern Region	Other - Cankerworm
Project Director:	*	
Mailing Address:	USDA Forest Service Federal Building P.O. Box 7669 Missoula, MT 59807	
PROJECT LOCATION		SELECTED INSECTICIDE
Project Location:	Burleigh ND	Biological
*	*	Pesticide Name
*	*	Dipel TM WP
(County)	(State)	*
		*
		(brand name)
		(common name)
Number of treated acres within project boundary:	90 AC	
PROJECT DATES	1978 (year)	TYPE OF APPLICATION
		Diluted
PROJECT CLASSIFICATION		TYPE OF AIRCRAFT
	Pilot Test	Fixed-wing
		SPRAY SYSTEM
		Hydraulic Nozzles

Project Objectives:

Demonstrate and evaluate the effectiveness of aerially applied B.t. for cankerworm control in shelterbelts. Determine the feasibility of night spraying to reduce wind-caused spray drift. Evaluate costs of aerial B.t. applications.

Abstract:

In 1978 a cooperative project to demonstrate effectiveness of Bacillus thuringiensis to control cankerworms in shelterbelts was conducted in Burleigh County, North Dakota by the USDA Forest Service, North Dakota State University, and the North Dakota Department of Forestry. Dipel TM wettable powder was applied using a Cessna Ag Truck equipped with flat fan nozzle tips (T8008).

Project Publications and Reports:

Hard, J. 1979. A reevaluation of 1978 aerial Bacillus thuringiensis Berliner (BT) applications for cankerworm control in Siberian elm shelterbelts. Report No. 79-18. USDA Forest Service, Northern Region, Forest Insect & Disease Management, State & Private Forestry, Missoula, MT.

Hard, J., R. Frye, D. Carey, and M.E. Dix. 1979. An evaluation of day and night aerial Bt applications for cankerworm control in siberian elm shelterbelts. USDA Forest Service, Northern Region, State and Private Forestry, Missoula, MT.

Flavell, T.H. and J.E. Dewey. 1978. Work plan - A demonstration/pilot project utilizing Bacillus thuringiensis and carbaryl for suppression of spring and fall cankerworms in North Dakota.

Morris, A.L. 1978. Data report - Tethersonde soundings for U.S. Forest Service, Bismarck, N.D. - May 23-29, 1978. Prepared by Ambient Analysis, Inc. for USDA Forest Service, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Idaho Department of Lands
 Agency: *

Project Director: R. Ladd Livingston

Mailing Address: Idaho Department of Lands
 P.O. Box 670
 Coeur D'Alene, ID 83814
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Valley ID
 Boise ID
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Orthene	Acephate
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 140,167 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Fixed-Wing and Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To suppress western spruce budworm populations using one aerial application of carbaryl (1 lb a.i. in 1/2 gal diesel/acre) or Orthene (1/2 lb a.i. in 1 gal water/acre), to acceptable population densities (2.1 to 3 larvae/100 units).

Abstract:

In 1979 the Idaho Cooperative Spruce Budworm Project was conducted on 140,167 acres (includes 637 acres of re-treatment) in Valley and Boise Counties, near the community of Cascade, Idaho. Federal, State of Idaho, Boise Cascade Corporation, and private lands were treated with either Sevin 4-Oil or Orthene. Aircraft used to apply the insecticide included four Grumman TBM's, one Grumman Ag-Cat, and one Hiller 12E helicopter. All aircraft were equipped with Spraying Systems, Inc. TeeJet flat fan nozzles.

Project Publications and Reports:

Livingston, R.L., J.W. Schwandt, J. Preston, W. Ciesla, B. Davidek, D. Beckman, L. Spickelmire, R. Johnson. 1982. 1979 western spruce budworm control project, Cascade, Idaho. Report No. 82-4. Idaho Department of Lands, Coeur D'Alene, ID.

Marsden, M.A., D.B. Cahill, and R.L. Livingston. 1985. Status of western spruce budworm populations following the 1979 Cascade, Idaho control project. Report No. 85-3. USDA Forest Service, Forest Pest Management, Methods Application Group, Ft. Collins, CO.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Larry Stipe
 Mailing Address: USDA Forest Service
 Coop. Forestry & Pest Mgt.
 Fed. Bldg., P.O. Box 7669
 Missoula, MT 59807

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Butte	MT
	Silver Bow	MT
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Biological	
Pesticide Name	
Dipel 4L	<u>Bacillus thuringiensis</u>
Thuricide 16B	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 16,750 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1981 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To obtain performance data on two registered formulations of Bacillus thuringiensis on western spruce budworm populations in Central Montana.

Abstract:

In 1981 a pilot test was conducted in Central Montana by the USDA Forest Service to obtain performance data on two registered formulations of B.t. (Dipel 4L and Thuricide 16B) on western spruce budworm. The project area included lands on the Deerlodge and Beaverhead National Forests and adjacent Bureau of Land Management, State of Montana, and private lands. The formulations were applied using Turbo Thrush aircraft equipped with Spray Systems, Inc. fulljet one-eighth 66A8W spray tips.

Project Publications and Reports:

Marsden, M.A., D.B. Twardus, and W.M. Ciesla. 1984. Efficacy of Bacillus thuringiensis on western spruce budworm relative to deposit density and foliar development. Report No. 84-7. USDA Forest Service, Forest Pest Management, Methods Application Group, Fort Collins, CO.

Stipe, L.E., C.G. Niwa, R.G. Eder, K.E. Gibson, and H.E. Meyer. 1983. Pilot project of Bacillus thuringiensis against western spruce budworm in central Montana, 1981. Report 83-4. USDA Forest Service, Northern Region, Cooperative Forestry and Pest Management, Missoula, MT.

Stipe, L.E., C.G. Niwa, and R.G. Eder. 1984. Treatment effects three years following a B.T. application to control western spruce budworm. Report 84-12. USDA Forest Service, Northern Region, Cooperative Forestry and Pest Management, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Larry Stipe
 Mailing Address: USDA Forest Service
 Coop. Forestry & Pest Mgt.
 Fed. Bldg., P.O. Box 7669
 Missoula, MT 59807

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location:	Latah	ID
	Moscow	ID
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Biological		
Pesticide Name	TM Biocontrol-1	NPV
*	*	*
*	*	*
(brand name)		(common name)

Number of treated acres within project boundary:
 600 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1985 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To obtain data on the performance of a USDA-produced DFTM nucleopolyhedrosis virus formulation (TM Biocontrol-1) produced in Corvallis, OR.

Abstract:

The USDA Forest Service conducted a pilot control project near Moscow, Idaho in 1985 to evaluate the performance of DFTM virus formulation produced by the Forest Service in Corvallis, Oregon. TM Biocontrol-1 was applied at 1/2 oz/acre in a tank mix of molasses and Orzan (in place of Shade) at 1 gal/acre. A helicopter was used to apply the formulation to three 200-acre blocks.

Project Publications and Reports:

L.E. Stipe, K.E. Gibson, and R.L. Livingston. 1986. Progress report - A pilot project to evaluate efficacy of aerially applied nucleopolyhedrosis virus on Douglas-fir tussock moth in Northern Idaho, 1985. Report 86-13. USDA Forest Service, Cooperative Forestry and Pest Management, Missoula, MT. and Idaho Department of Lands, Coeur D'Alene, ID.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: Dick Hodge et al.
 Mailing Address: Palouse Ranger District
 Potlatch, Idaho
 *

PROJECT LOCATION

Project Location:	Latah	ID
	Potlatch	ID
*	*	
	(County)	(State)

Number of treated acres within project boundary:
 1,930 AC

PROJECT DATES 1986 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Biological	
Pesticide Name	
TM Biocontrol-1	NPV
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To minimize damage to high-risk and/or high-value stands through the introduction of a natural virus during an early stage of the current outbreak cycle.

Abstract:

USDA Forest Service, in cooperation with Idaho Department of Lands, conducted an operational project to control the DFTM outbreak near Potlatch, Idaho using TM Biocontrol-1 virus. Application was made using a fixed-wing aircraft. This project had planned to treat 32,000 acres but was terminated after the first block of 1,930 acres was sprayed. Termination was due to a natural population collapse.

Project Publications and Reports:

Stipe, L.E., K.E. Gibson, and R.L. Livingston. 1986. Work plan - Douglas-fir tussock moth suppression program, Northern Idaho, 1986. USDA Forest Service, Cooperative Forestry and Pest Management, Missoula, MT. and Idaho Department of Lands, Coeur D'Alene, ID.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Northern Region
 Project Director: *
 Mailing Address: USDA Forest Service
 Federal Building
 P.O. Box 7669
 Missoula, MT 59807

PROJECT LOCATION

Project Location: Big Timber (town) MT
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 700 AC

PROJECT DATES

1986 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Dipel	*
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

The objective of this control project was foliage protection to insure future cone production for the Iron Mountain timber sale area.

Abstract:

In June 1986 a western spruce budworm control project was conducted by the USDA Forest Service about 15 miles south of Big Timber, Montana, on the Big Timber Ranger District, Gallatin National Forest. A Cessna Ag Wagon was used to apply Bacillus thuringiensis to approximately 700 acres to enhance natural regeneration opportunities in the Iron Mountain timber sale area.

Project Publications and Reports:

Bousfield, W., F. Cifala, and R. Kracht. 1987. Western spruce budworm control project on the Big Timber Ranger District, Gallatin National Forest, Montana. Report 87-8. USDA Forest Service, Northern Region, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: USDA Forest Service
Project Director: Rocky Mountain Region
Mailing Address: Bruce Hostetler
USDA Forest Service
Forest Pest Management
P.O. Box 3623
Portland, OR 97208

TARGET PEST

Other - Jack Pine Budworm

PROJECT LOCATION

Project Location:	Thomas	NE
	Blaine	NE
	*	*
	(County)	(State)

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	<u>Bacillus thuringiensis</u>
Thuricide 16B	*
Dipel 4L	
*	
(brand name)	(common name)

Number of treated acres within project boundary:
3,660 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1980 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To suppress Jack pine budworm populations to help maintain current levels of tree vigor until the Forest decided what management strategies would be employed in Jack pine stands.

Abstract:

A suppression project was conducted by the USDA Forest Service in 1980 on the Nebraska National Forest to reduce Jack pine budworm populations. Thuricide 16B and Dipel 4L were applied using two Grumman Ag Cats each equipped with 18 TeeJet spray nozzles with disc-core type (D6-46) cone spray tips. Approximately 3,660 acres were treated.

Project Publications and Reports:

Hostetler, B.B. 1981. Suppression of jack pine budworm, Nebraska National Forest, 1980. Technical Report R2-25. USDA Forest Service, Forest Pest Management, State and Private Forestry, Rocky Mountain Region, Lakewood, CO.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Douglas L. Parker
 Mailing Address: USDA Forest Service
 Forest Pest Management
 517 Gold Avenue S.W.
 Albuquerque, NM 87102

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Rio Arriba	NM
	Sandoval	NM
*	*	*
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	Carbaryl
Sevin 4-Oil	*
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 37,450 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1977 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Other (Suppression/Eval.)

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Suppress budworm population to as low a level as possible and to evaluate prolonged effectiveness of suppressing the budworm population for 2 or more years following treatment.

Abstract:

In 1977 the USDA Forest Service conducted a suppression and evaluation project in an isolated mountain range on the Santa Fe National Forest (34,000 acres) and on the Jemez Pueblo Indian Reservation (3,450 acres). This project was the first attempt to evaluate multi-year effects of an aerially applied chemical on western spruce budworm. Carbaryl (Sevin 4-Oil) was applied using helicopters equipped with Spraying System flat fan 8006 and 8004 spray nozzles.

Project Publications and Reports:

Parker, D.L., R.E. Acciavatti, E.D. Lessard, I.R. Ragenovich. 1980. Western spruce budworm suppression and evaluation project using carbaryl - Final Report, 1977-79, New Mexico. Report No. R3 81-2. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

Ragenovich, I.R. and D.L. Parker. 1981. Western spruce budworm suppression and evaluation project using carbaryl, 1980 - Progress Report No. 4. Report No. R3 81-9. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

Telfer, W.G., I.R. Ragenovich, T.J. Rogers. 1982. Western spruce budworm suppression and evaluation project using carbaryl - 1977, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico - Progress Report No. 5. Report No. R3 82-7. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

Telfer, W.G. 1983. Western spruce budworm suppression and evaluation project using carbaryl - 1977, Santa Fe National Forest and Jemez Pueblo Indian Reservation, New Mexico - Progress Report No. 6. Report No. R3 83-9. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Thomas H. Hofacker
 Mailing Address: USDA Forest Service
 Forest Pest Management
 201 14th Street, SW
 Washington, D.C. 20250

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location:	Los Alamos	NM
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Biological		
Pesticide Name		
TM Biocontrol-1	NPV	
*	*	
*	*	
(brand name)	(common name)	

Number of treated acres within project boundary:
 4,480 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1978 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To evaluate effectiveness of the U.S. Environmental Protection Agency registered preparation of Douglas-fir tussock moth virus in suppressing an outbreak population of the Douglas-fir tussock moth under operational conditions in New Mexico. In addition, data collected during the project were to be used to calibrate the "DFTM Stand Outbreak Model" developed by the Douglas-fir Tussock Moth Research and Development Program.

Abstract:

In 1978 the USDA Forest Service in cooperation with New Mexico State University conducted a pilot control project in Los Alamos County, New Mexico to evaluate the effectiveness of TM Biocontrol-1 in suppressing the Douglas-fir tussock moth. Approximately 4,480 acres were aerially treated using rotary-wing aircraft.

Project Publications and Reports:

R3 79-6 - 1978 Cooperative Douglas-Fir Tussock Moth NPV Pilot Control Project. (Complete reference not available)

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Thomas H. Hofacker
 Mailing Address: USDA Forest Service
 Forest Pest Management
 201 14th Street, SW
 Washington, D.C. 20250

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location:	• Los Alamos (town)	NM
	*	*
	*	*
	(County)	(State)

SELECTED INSECTICIDE

Biological		
Pesticide Name	TM Biocontrol-1	NPV
	*	*
	*	*
	(brand name)	(common name)

Number of treated acres within project boundary:
 800 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To reduce tussock moth populations, and thereby reduce tussock moth caused tree mortality, maintain recreational and aesthetic values, and reduce wildfire hazards.

Abstract:

In 1979 a Douglas-fir tussock moth suppression project was conducted by the USDA Forest Service on the Santa Fe National Forest, New Mexico. A Marsh Turbo Thrush S2R-T applied TM-Biocontrol-1, a Douglas fir tussock moth nucleopolyhedrosis virus preparation, to approximately 800 acres.

Project Publications and Reports:

Hofacker, T.H., T. Smith, D.P. Graham, R.E. Sandquist, J.W. Barry, and G. Blackwell. 1980. 1979 Douglas-fir tussock moth suppression projects - Santa Fe National Forest and Ellena Gallegos Grant. Report No. R3 80-2. USDA Forest Service, Southwestern Region, Forest Insect and Disease Management, State and Private Forestry, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: New Mexico Dept. Nat. Res.
 Project Director: Garry Blackwell
 Mailing Address: New Mexico Dept. Nat. Res.
 Forestry Division
 Santa Fe, NM
 *

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location: Albuquerque (town) NM
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological	
Pesticide Name	
TM Biocontrol-1	NPV
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 600 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To reduce Douglas-fir tussock moth populations, and thereby reduce tussock moth caused tree mortality,
 maintain recreational and aesthetic values, and reduce wildfire hazards.

Abstract:

In 1979 a douglas-fir tussock moth suppression project was conducted on private land located 16 miles northeast of the city center of Albuquerque, New Mexico, within the boundary of the Ellena Gallegos Grant on the west side of the Sandia Mountains. This was a cooperative project between the Forestry Division of the New Mexico Department of Natural Resources, the New Mexico Department of Agriculture, administrators of the Ellena Gallegos Grant, and the USDA Forest Service. A Marsh Turbo Thrush S2R-T applied TM Biocontrol-1, a douglas-fir tussock moth nucleopolyhedrosis virus preparation, to approximately 600 acres.

Project Publications and Reports:

Hofacker, T.H., T. Smith, D.P. Graham, R.E. Sandquist, J.W. Barry, and G. Blackwell. 1980. 1979 douglas-fir tussock moth suppression projects - Santa Fe National Forest and Ellena Gallegos Grant. Report R3 80-2. USDA Forest Service, Southwestern Region, Forest Insect and Disease Management, State and Private Forestry, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: M. J. Stelzer (retired)
 Mailing Address:

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Coconino	AZ
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Thuricide 16B
 Thuricide 32B
 Dipel
 (brand name)

Bacillus thuringiensis
Bacillus thuringiensis
Bacillus thuringiensis
 (common name)

Number of treated acres within project boundary:
 1,500 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1980 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine the efficacy of three formulations of B.t. applied at a dosage of 8 BIU's per acre in terms of population reduction and protection of foliage from the western spruce budworm.

Abstract:

In 1980 the USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory conducted a research field test to determine efficacy of three formulations of Bacillus thuringiensis (Thuricide 16B, Thuricide 32B, Dipel) against western spruce budworm. The formulations were applied using fixed-wing aircraft to approximately 1,500 acres in Coconino County, Arizona. A multiple-comparison test showed that all three B.t. treatments had significantly lower survival rates than the controls but were not significant from each other. Corrected population reductions for Thuricide 16B, Thuricide 32B, and Dipel were 44.4, 59.2 and 48.5 percent respectively. These reductions are comparable to other B.t. tests in Washington, Montana, and British Columbia. Feeding levels were slightly lower in all three B.t. treatments from the check plots but overall foliage protection was adversely affected by a delay in spraying. B.T. mortality rates in a foliage bioassay declined rapidly over time. Less than 50 percent of the original activity remained on the foliage at 3 days after spraying.

Project Publications and Reports:

Selzer, M.J. and D.W. Scott. 1981. Field evaluation of Bacillus thuringiensis for control of the western spruce budworm: Aerial application trials - Final Report. Canada/U.S. Spruce Budworm Program-West.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service and
 Agency: Southwestern Region
 Project Director: Douglas L. Parker
 Mailing Address: USDA Forest Service
 Forest Pest Management
 517 Gold Avenue, SW
 Albuquerque, NM 87102

PROJECT LOCATION

Project Location:	Taos	NM
	Colfax	NM
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 15,686 AC

PROJECT DATES 1981 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	
Dipel 4L	<u>Bacillus thuringiensis</u>
Thuricide 16B	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Evaluate efficacy of Thuricide 16B and Dipel 4L against western spruce budworm under operational conditions. Determine the amount of foliage protection achieved by a treatment of B.t. Compare effectiveness of single applications of two formulations of B.t. against the western spruce budworm. Identify any formulation, mixing, or application problems associated with B.t. when used on an operational basis. Evaluate the effectiveness for 2 years following treatment to determine protection beyond year of treatment.

Abstract:

In 1981 the USDA Forest Service in cooperation with the New Mexico Department of Natural Resources and the New Mexico Department of Agriculture conducted a pilot project in northern New Mexico. The purpose was to determine the value of using Bacillus thuringiensis (Thuricide 16B and Dipel 4L) for control of western spruce budworm. Two fixed-wing aircraft were used to treat 15,686 acres east of Taos, New Mexico.

Project Publications and Reports:

Cota, J.A. 1987. Operational use of a biological insecticide: Bacillus thuringiensis for control of the western spruce budworm in northern New Mexico - Final report of the 1981 pilot project. Report No. R3 87-6. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

Ragenovich, I.R. 1983. Pilot project to evaluate the operational use of Bacillus thuringiensis against the western spruce budworm in northern New Mexico - 1981-82. Carson National Forest and State and private land, New Mexico - Progress Report No. 1. Report No. R3 84-1. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Iral R. Ragenovich
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

TARGET PEST

Other - Pandora Moth

PROJECT LOCATION

Project Location:	Coconino	AZ
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene	Acephate
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 3,000 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1981 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Evaluate operational effectiveness (reduction of insect densities and prevention of defoliation) of an aerial application of acephate against the pandora moth on selected areas of the Kaibab National Forest. Reduce the adverse impact of the insect on the visual and recreational quality of the area. Reduce the adverse effects of defoliation on the Kaibab squirrel and other wildlife. Reduce potential growth loss and tree susceptibility resulting from defoliation. Identify any problems associated with the mixing, timing, formulation, and application of acephate for use on pandora moth under field conditions in the Southwest.

Abstract:

In 1981 a pilot project was conducted by the USDA Forest Service on the Kaibab National Forest in Arizona to determine the effects of acephate on pandora moth. Orthene was aerially applied to 3,000 acres using fixed-wing aircraft.

Project Publications and Reports:

Bennett, D.D. and I.R. Ragenovich. 1982. A pilot control project to evaluate acephate for control of pandora moth, Coloradria pandora Blake (Lepidoptera:Saturniidae), Jacob Lake, Arizona, 1981 - North Kaibab Ranger District, Kaibab National Forest, Arizona. Report No. R3 82-10. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Ray Evans
 Mailing Address:

TARGET PEST
 Western Spruce Budworm

PROJECT LOCATION

Project Location:	Colfax	NM
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Both	
Pesticide Name	Sevin 4-Oil
	Carbaryl
	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 68,347 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1982 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Reduce western spruce budworm (WSBW) populations to as low a level as possible so that predators and parasites, in conjunction with density independent factors, such as weather, exert considerable population regulation. Keep tree damages below economic level. Prevent spread of WSBW infestations onto adjacent uninhabited lands. Prevent severe defoliation.

Abstract:

During June 1982 a suppression project against the western spruce budworm was conducted by the USDA Forest Service on the Carson National Forest and State and private lands in Moreno Valley, New Mexico. The insecticide Bacillus thuringiensis was used to treat sensitive and riparian areas and the remaining areas were treated with carbaryl. Application was by turbine-powered fixed-wing aircraft.

Project Publications and Reports:

Telfer, W.G., J.P. Linnane, and J.H. Davis. 1983. Western spruce budworm suppression project--1982 - Carson National Forest and State and private lands, New Mexico. Report R-3 83-12. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM and New Mexico Department of Agriculture, Division of Agricultural and Environmental Services, Bureau of Entomology and Nursery Industries, Las Cruces, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Agency:	USDA Forest Service Rocky Mountain Station
Project Director:	John Schmid
Mailing Address:	USDA Forest Service Rocky Mountain Station 240 West Prospect Ft. Collins, CO 80526

TARGET PEST

Other - Pandora Moth

PROJECT LOCATION

Project Location: Coconino AZ
* *
* *
(County) (State)

SELECTED INSECTICIDE

Chemical

Number of treated acres within project boundary:
160 AC

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

ROTARY-WING

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Field test the efficacy of four aerially applied insecticides against early instar pandora moth larvae.

Abstract:

In 1982 the Rocky Mountain Forest Range & Experiment Station conducted a research field test to test the efficacy of four insecticides (Orthene Forest Spray 75sp, Sevin FR, Dimilin 25w, and Malathion ULV concentrate) against early instar pandora moth larvae. The insecticides were aerially applied by helicopter to blocks 8 ha in size on the Kaibab National Forest, Arizona.

Project Publications and Reports:

Ragenovich, I.R., J.M. Schmid, D.D. Bennett, J.W. Barry, and C.E. Richmond. 1986. Field evaluation of four insecticides against the pandora moth, 1982. Insecticide and Acaricide Tests 11:426.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Stet Edmunds
 Mailing Address: Carson National Forest
 P.O. Box 558
 Taos, NM 87571
 *

PROJECT LOCATION

Project Location:	Carson NF	NM
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 37,587 AC

PROJECT DATES

1983 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Both	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Thuricide 32LV	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Reduce western spruce budworm (WSBW) populations to as low a level as possible so that predators and parasites, in conjunction with density independent factors, such as weather, exert considerable population regulation. Keep tree damages below economic levels. Prevent spread of WSBW infestations onto adjacent uninfested lands. Prevent severe defoliation.

Abstract:

In June and July of 1983 a suppression project was conducted by the USDA Forest Service on the El Rito and Tres Piedras Ranger Districts, Carson National Forest. Carbaryl and Bacillus thuringiensis were applied on 37,587 acres of mixed conifer stands where western spruce budworm population levels were just reaching outbreak levels. Bacillus thuringiensis was applied to sensitive and riparian areas. Application was made using Air Tractor 400's equipped with 8020 flat fan nozzles.

Project Publications and Reports:

Telfer, W.G. and J.P. Linnane. 1984. Western spruce budworm suppression project--1983, Carson National Forest, New Mexico. Report R-3 84-14. USDA Forest Service, Southwestern Region, State & Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Stet Edmunds
 Mailing Address: Carson National Forest
 P.O. Box 558
 Taos, NM 87571
 *

PROJECT LOCATION

Project Location:	Rio Arriba	NM
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 34,600 AC

PROJECT DATES

1984 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	<u>Thuricide 32LV</u>
	*
	*
	(brand name)
	<u>Bacillus thuringiensis</u>
	*
	*
	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

1. Reduce western spruce budworm populations to five larvae per 100 buds or less so that (a) predators and parasites, in conjunction with density independent factors such as weather, could further reduce insect numbers; and (b) tree damages would be reduced.
2. Evaluate the operational effectiveness of B.t. applied at reduced dilution rates.

Abstract:

In 1984 a suppression project was conducted by the USDA Forest Service on the Carson National Forest, New Mexico. Approximately 34,600 acres were treated with Bacillus thuringiensis (Thuricide 32LV) to combat western spruce budworm. Application was completed using four turbine-powered Air Tractor 400's.

Project Publications and Reports:

Rogers, T.J., J.M. Chavez, and J.P. Linnane. 1985. Western spruce budworm suppression project using Bacillus thuringiensis Berliner--1984, Carson National Forest, New Mexico. Report R-3 85-6. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Tom Davis
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location:	Otero	NM
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 240,900 AC

PROJECT DATES

1984 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Both	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Dipel	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

The overall project objective was to reduce western spruce budworm populations to as low a level as possible so that damages to visual quality and timber resources could be maintained at acceptable levels without annual re-treatments. An additional objective was to conduct the suppression project in an efficient and safe manner.

Abstract:

During May and June 1984, the USDA Forest Service conducted a western spruce budworm suppression project on 240,900 acres of mixed conifer forests in the Sacramento Mountain Range of south-central New Mexico. Bacillus thuringiensis was aerially applied to sensitive areas where human habitation or water bodies were of concern. Carbaryl was aerially applied to remaining areas. Application was by fixed-wing aircraft (Air Tractor 400 and Ayers Turbo Thrush).

Project Publications and Reports:

Bennett, D.D. and J.P. Linnane. 1985. Western spruce budworm suppression project-1984, Lincoln National Forest, Mescalero Apache Indian Reservation, and adjacent private lands, New Mexico. Report R-3 85-11. USDA Forest Service, Southwestern Region, State & Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Agency: USDA Forest Service
 Southwestern Region
 Project Director: Stet Edmunds
 Mailing Address: Carson National Forest
 P.O. Box 558
 Taos, NM 87571
 *

PROJECT LOCATION

Project Location:	Taos	NM
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 23,230 AC

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	
Thuricide 48LV	<u>Bacillus thuringiensis</u>
Dipel 6L	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

PROJECT DATES

1985 (year)

PROJECT CLASSIFICATION

Operational Project

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 48 oz
 Amount of Active Ingredient Applied
 Per Acre: 12 BIU's

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Reduce western spruce budworm population to five or fewer larvae per 100 buds.

Reduce western spruce budworm caused defoliation damages along the Red River and Angel Fire visual corridors.

Abstract:

In 1985, Forest Pest Management in cooperation with the Carson National Forest, New Mexico Department of Natural Resources, Forestry Division, and the New Mexico Department of Agriculture, conducted a western spruce budworm suppression project on selected areas of the Questa and Taos Ranger Districts, Angel Fire Corporation lands, and adjoining private ownerships in northern New Mexico. Of the total 23,230 acres, approximately 15,420 acres of the Carson National Forest and adjoining lands were treated with Thuricide 48LV and 7,900 acres of Angel Fire Corporation and adjoining private ownerships were treated with Dipel 6L.

Project Publications and Reports:

Johnson, J.O. and A.H. Smith. 1985. Western spruce budworm Bacillus thuringiensis (B.t.) suppression project--1985, State of New Mexico and Angel Fire Corporation and homeowner lands. New Mexico Department of Agriculture, Forest Pest Management.

Rogers, T.J. 1992. Western spruce budworm suppression project using Bacillus thuringiensis Berliner--1985, Carson National Forest, New Mexico. R-3 92-2. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Utah State Dept. of Ag.
 Agency: *

Project Director: Van Burgess

Mailing Address: Utah State Dept. of Ag.
 350 North Redwood Road
 Salt Lake City, UT 84116
 *

PROJECT LOCATION

Project Location: Salt Lake UT
 * *
 * *
 (County) (state)

Number of treated acres within project boundary:
 1,200 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Gypsy Moth

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Dipel 8L	*
*	*
*	(common name)
(brand name)	

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To eradicate gypsy moth from infested areas in the Olympus Cove area of Salt Lake City, Utah and to prevent further spread within the State.

Abstract:

In 1989 the Utah State Department of Agriculture conducted an aerial spray project to eradicate gypsy moth in the Olympus Cove area of Salt Lake City, Utah and to prevent further spread within the State. A 1,200 acre block was treated with Dipel 8L (16 BIU's/acre) at 96 oz/acre using a Bell 206B-3 helicopter equipped with rotary atomizers. Post-treatment larval and egg mass counts indicated a 95 percent reduction in larval numbers and a 98 percent reduction in egg masses.

Project Publications and Reports:

Quilter, M. and S. Munson. 1989. A summary of Utah's 1989 gypsy moth eradication program. In: Proceedings of the 1989 National Gypsy Moth Review, November 6-9, 1989, Annapolis, MD, pp. 61-70.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Region
 Project Director: John R. Pierce
 Mailing Address: *
 *
 *
 *

PROJECT LOCATION

Project Location:	Modoc	CA
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 9,000 AC

PROJECT DATES

1974 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Other - Modoc Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Dylox 1.5	Trichlorfon
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To investigate the efficacy and environmental impact of two dosages (0.75 lb and 1.0 lb/acre) of trichlorfon for the suppression of a Modoc budworm infestation.

Abstract:

In 1974 the USDA Forest Service conducted a pilot test in Modoc County, California to investigate the efficacy and environmental impact of two dosages (0.75 and 1.0 lb/acre) of trichlorfon for the suppression of Modoc budworm. Application was made using a Bell 47G helicopter using flat fan nozzles equipped with 8002 tips. Population reductions were 89.4 and 97.2 percent, respectively, measured 6 days post-treatment.

Project Publications and Reports:

Project Report: Pilot control project of Dylox on the Modoc budworm - 1974. Forest Service, 630 Sansome Street, San Francisco, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Weyerhaeuser Company
 Agency: *
 Project Director: Dave Overhulser
 Mailing Address: Oregon Dept. of Forestry
 2600 State Street
 Salem, OR 97310
 *

PROJECT LOCATION

Project Location: Klamath OR
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 45 AC

PROJECT DATES

1979 (year)

TARGET PEST

Other - Western Pine Shoot Borer

SELECTED INSECTICIDE

Chemical - Pheromone		
Pesticide Name		
Z&E 9-dodecenyl acetate	Pheromone	
*	*	
*	*	
(brand name)		(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Other - specialized

Project Objectives:

Determine whether pheromone disruption would control pine shoot borer.

Abstract:

In 1979 Weyerhaeuser Company conducted a research field test in Klamath County, Oregon to determine whether pheromone disruption would control pine shoot borer. Hollow fibers containing a mixture of synthetic sex attractants of western pine shoot borer were applied by fixed-wing aircraft to approximately 45 acres of ponderosa pine plantations in southern Oregon. The dose was 15 g/ha. Tree damage in treated areas was reduced by an average of 67 percent for terminal shoots.

Project Publications and Reports:

Overhulser, D., G.E. Daterman, L. Sower, C. Sartwell, and T. Koerber. 1980. Mating disruption with synthetic sex attractants controls damage by Eucosma sonomana (Lepidoptera:Tortricidae, Olethreutinae) in Pinus ponderosa plantations II. Aerially applied hollow fiber formulation. Can. Entomol. 112:163-65.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service, PNW
 Agency: Pacific Northwest Station
 Project Director: G. Daterman et al.
 Mailing Address: Forestry Sciences Lab.
 3200 Jefferson Way
 Corvallis, OR 97331
 *

TARGET PEST

Other - Western Pine Shoot Borer

PROJECT LOCATION

Project Location:	Klamath	OR
	Shasta	CA
*	*	
	(County)	(State)

SELECTED INSECTICIDE

Chemical - Pheromone		
Pesticide Name		
Z&E 9-dodecenyl acetate	Pheromone	
*	*	
*	*	
(brand name)	(common name)	

Number of treated acres within project boundary:
 2,400 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1981 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Other (Research & Pilot)

SPRAY SYSTEM

Other - Specialized

Project Objectives:

Establish efficacy and dose/response.

Abstract:

In 1981 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test/pilot test in Klamath County, Oregon and Shasta County, California using pine shoot borer pheromone. Synthetic pheromone (2 different formulations - fibers and flakes) were applied to 2,400 acres using a fixed wing aircraft. Synthetic pheromone when applied by air in ConRel (now Scentry) fibers or Hercon flakes at 10 to 20 g of a.i./ha, reduced damage to pines caused by larvae of a pine shoot borer by 76 to 86 percent. Lesser dosages of 0.2 to 2 g/ha were less effective.

Project Publications and Reports:

Sower, L., D. Overhulser, G. Daterman, C. Sartwell, D. Laws, and T. Koerber. 1982. Control of Eucosma sonomana by mating disruption with synthetic sex attractant. J. Econ. Entomol. 75:315-318.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or California Dpt. of Forestry
 Agency: *
 Project Director: *
 Mailing Address: California Dpt. of Forestry
 P.O. Box 944246
 Sacramento, CA 94244-2460
 *

TARGET PEST

Other - Western Budworm

PROJECT LOCATION

Project Location: Trinity CA
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Bactospeine
 *
 *
 (brand name) Bacillus thuringiensis
 *
 *
 (common name)

Number of treated acres within project boundary:
 88,000 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1985 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Prevent defoliation, growth loss, and top kill.

Abstract:

In May 1985 the California Department of Forestry conducted an aerial spray project against western budworm in Trinity County, California. The outbreak of this budworm was historically unprecedented. By 1985, 130,000 acres of mixed ownership within the boundaries of the Weaverville District, Shasta-Trinity National Forest were defoliated at light, moderate, or heavy levels. A total of 88,000 acres was sprayed with B.t. at 12 BIU's/acre using fixed-wing aircraft. Based on foliage retention, the project was highly successful. However, post-treatment larval sampling 10 to 14 days after treatment indicated poor efficacy (25%). A cold spring rainstorm three days post-treatment also did not fully explain the marked increase in foliage retention. Projection of mostly light defoliation and 3,000 acres of moderate defoliation for 1986 did not occur. Defoliation was not observed in 1986, or since (1986-1989).

Project Publications and Reports:

Project Report: Budworm control project fiscal year 1984-85, Trinity Zone of infestation. California Department of Forestry, Sierra Cascade Region, Redding, CA.

Dale, J.W. 1985. Biological Evaluation: Status of an outbreak of a western budworm, Choristoneura carana californica, on the Weaverville RD, Shasta Trinity NF-1985. Report 85-37.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Lonne Sower/(John Wenz R5)
 Mailing Address: Forestry Sciences Lab
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location:	Placer	CA
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 160 AC

PROJECT DATES

1986 (year)

PROJECT CLASSIFICATION

Other (Research & Pilot)

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Chemical - Pheromone	
Pesticide Name	
Z-6-heneicosen-11-one	Pheromone
in Scentry fibers	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Other - special equipment

Project Objectives:

To conduct additional field tests of Douglas-fir tussock moth disruption. To test DFTM disruption against a pre-outbreak level population.

Abstract:

In 1986 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test/pilot test in Placer County, California. A fixed-wing aircraft was used on the project. Synthetic sex pheromone of Douglas-fir tussock moth was applied at 25 g/ha (10g/acre) in hollow fibers to four plots of 16 ha (40 acres) each with pre-outbreak level populations. Treatment reduced the population level of the next generation by 74 percent and 68 percent respectively for egg mass and larval samples relative to untreated check plots. A key egg parasite of the tussock moth, Telenomus californicus Ashmead, was not adversely affected by the treatment.

Project Publications and Reports:

Sower, L., J. Wenz, D. Dahlsten, G. Daterman. 1990. Field testing of pheromone disruption on pre-outbreak populations of Douglas-fir tussock moth (Lepidoptera:Lymantriidae). Journal of Econ. Ent. (Accepted).

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
Agency: Pacific Southwest Region
Project Director: John Wenz/Roy Beckwith(PNW)
Mailing Address:
*
*
*
*

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location: Plumas CA
* *
* *
(County) (State)

SELECTED INSECTICIDE

Biological

Pesticide Name

(brand name)

Bacillus thuringiensis
*
*
(common name)

Number of treated acres within project boundary:
3.810 AC

TYPE OF APPLICATION

Both

PROJECT DATES

1988 (year)

TYPE OF AIRCRAFT

Fixed-wing

PROJECT CLASSIFICATION

Other (Research & Pilot)

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To evaluate the efficacy of Thuricide 32LV applied at a dosage of 16 BIU's/acre at two dilution rates against DFTM. The two rates were: undiluted applied at 64 oz/acre and diluted 1:1 with water at 128 oz/acre.

Abstract:

In 1988 the USDA Forest Service conducted a combined pilot test/field test in Plumas County, California to evaluate efficacy of Bacillus thuringiensis against the Douglas-fir tussock moth. Two formulations of Thuricide 32LV were applied to 3,810 acres using an Ag Tractor aircraft equipped with six Micronair rotary atomizers. DFTM population densities were high; the pre-spray densities ranged from 85.9 to 856.2 larvae/1000 in² of foliage. The treatment effects were variable. The spray application reduced larval populations to means ranging from 7.6 to 61.4 larvae/1000 in². The diluted treatment generally produced better results than the undiluted. Cryptic shelter collections of pupae and egg masses produced the same general results.

Project Publications and Reports:

Project Report: Combined pilot project/field experiment using diluted and undiluted Bacillus thuringiensis var. Kurstaki at 16 BIU's per acre against the Douglas-fir tussock moth, Orgyia pseudotsugata, in northern California - 1988.

Wenz, J.M. and R.C. Beckwith. 1989. Combined pilot project/field experiment using Bacillus thuringiensis to control the Douglas-fir tussock moth in California. Report on file. USFS.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Region
 Project Director: Tom Simonson
 Mailing Address: Lassen National Forest
 55 S. Sacramento Street
 Susanville, CA 96130
 *

PROJECT LOCATION

Project Location:	Plumas	CA
	Lassen	CA
	Butte	CA
	(County)	(State)

Number of treated acres within project boundary:
 83,871 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Thuricide 32LV	*
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To reduce tree mortality by reducing the DFTM populations by 80 percent.

Abstract:

In 1989 the USDA Forest Service conducted a Douglas-fir tussock moth aerial spray project in Plumas, Lassen, and Butte Counties, California on national forest and private lands. Approximately 83,871 acres were treated with Bacillus thuringiensis (Thuricide 32LV at 16 BIU's/acre) using eight Turbo Air Tractors equipped with 8010 flat fan nozzles. Based on the previous year's pilot/field study the treatment prescription called for application to begin at 50 percent dispersal instead of waiting for 10 days after hatch and dispersal (the old timing). Population reductions measured 14 days post-treatment averaged 89 percent. The early application protected about 50 percent of the new foliage. Egg mass surveys conducted in October found only three DFTM egg masses.

Project Publications and Reports:

None Available.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jack Mounts (retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location:	Union	OR
	Columbia	WA
	*	*
	(County)	(State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Zectran & Sevin	Mexacarbate & Carbaryl
Dylox	Trichlorfon
BEM	Bioethanomethrin
(brand name)	(common name)

Number of treated acres within project boundary:
 77,580 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1973 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine if (1) any of the test insecticides would significantly prevent tree foliage loss and subsequent tree damage due to tussock moth infestation; (2) any of the test insecticides would reduce tussock moth populations to an acceptable level; (3) either mexacarbate or trichlorfon would be significantly more effective with a double application than a single application at the prescribed dosage rates.

Abstract:

In 1973 the USDA Forest Service in cooperation with the State of Oregon and State of Washington conducted a pilot test for control of Douglas-fir tussock moth in Union County, Oregon and Columbia County, Washington. Insecticides used were Zectran, Sevin 4-Oil, Dylox, and BEM. A gross total of 77,580 acres was treated, of which 70,720 acres were given a double application, giving a total of 148,300 acres treated on a single application basis. The State of Oregon conducted the Dylox test in its entirety except for the contracting. All application was done using helicopters equipped with hydraulic nozzles.

Project Publications and Reports:

Mounts, J., D. McComb, S.W. Meso, L.F. Kline, and G.C. Trostle. 1974. Cooperative tests of chemical insecticides for control of the Douglas-fir tussock moth - 1973. USDA Forest Service, Region 6, Timber Management and State of Oregon, Department of Forestry.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific NW Station
 Project Director: C.G. Thompson (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location: Wallowa OR
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Dipel Bacillus thuringiensis
 Nucleopolyhedrosis virus NPV
 *
 (brand name) (common name)

Number of treated acres within project boundary:
 420 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1973 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine the efficacy of aerially applied nucleopolyhedrosis virus and Bacillus thuringiensis in controlling the Douglas-fir tussock moth in terms of larval mortality and foliage protection.

Abstract:

In 1973 the USDA Forest Service, Pacific Northwest Research Station, conducted a research field test in Wallowa County, Oregon to determine the efficacy of nucleopolyhedrosis virus and Bacillus thuringiensis in controlling douglas-fir tussock moth. Approximately 420 acres were treated using a helicopter equipped with hydraulic nozzles. Population reductions exceeded 95 percent at 35 days on plots treated with NPV dosages of 100×10^6 polyhedra/acre in 2 gal/acre of a 25 percent molasses formulation. Application of Dipel at 1 lb/acre in 25 percent molasses was as effective as the NPV. These treatments also provided excellent foliage protection. In contrast, Dipel formulated in BioFilm failed to reduce larval densities to a satisfactory level or to prevent severe defoliation.

Project Publications and Reports:

Stelzer, M.J., J. Neisess, and C.G. Thompson. 1975. Aerial applications of a nucleopolyhedrosis virus and Bacillus thuringiensis against the Douglas-fir tussock moth. J. Econ. Entomol. 68:269-272.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Agency:	USDA Forest Service Pacific Northwest Region
Project Director:	David McComb
Mailing Address:	*
	*
	*
	*

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location: Wallowa OR
* *
* *
(County) (State)

SELECTED INSECTICIDE

Chemical

Pesticide Name

nyloxx

4

brand name)

Trichlorofan

*

*

(common name)

Number of treated acres within project boundary: 600 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES 1974 (year)

TYPE OF APPLICATION

PROJECT SUPPORT TEAM

Billet Test

SPRAY SYSTEM

Project Objectives:

To determine if Dylox could be effective in substantially reducing the number of late instar DFTM larvae.

Abstract:

In 1974 the USDA Forest Service conducted a pilot control project on 600 acres in Wallowa County to determine if Dylox could be effective in substantially reducing the number of late instar Douglas-fir tussock moth larvae. Application was made using a helicopter equipped with hydraulic nozzles.

Project Publications and Reports:

Ciesla, W.M. Pilot control projects of chemical and microbial insecticides against Douglas-fir tussock moth - 1974. U.S. Forest Service, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: George Downing
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location:	Baker	OR
*	*	
*	*	
	(County)	(State)

Number of treated acres within project boundary:
 2,000 AC

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Dylox	Trichlorfon
Sevin 4-Oil	Carbaryl
DDT	DDT
(brand name)	(common name)

PROJECT DATES

1974 (year)

TYPE OF APPLICATION

Both

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine the efficacy of aerial application of carbaryl, trichlorfon, and DDT for control of Douglas-fir tussock moth.

Abstract:

In an effort to seek alternatives to DDT for control of Douglas-fir tussock moth, a pilot control project was conducted in Baker County near Halfway, Oregon during 1974 by the USDA Forest Service. Applications of Sevin, Dylox, and DDT were made using rotary-wing aircraft. Each treatment was replicated three times and applied to test plots 434 to 1,134 acres in size. The test was conducted by Lake Ontario Environmental Laboratories under contract to the USDA Forest Service, Region 6.

Project Publications and Reports:

Anonymous. 1974. Douglas-fir tussock moth research and pilot test program - season of 1974. U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Ciesla, W.M. Pilot control projects of chemical and microbial insecticides against Douglas-fir tussock moth - 1974. U.S. Forest Service, Missoula, MT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: John Neisess
 Mailing Address: USDA Forest Service
 Forest Pest Management
 630 Sansome Street
 San Francisco, CA 94111

PROJECT LOCATION

Project Location:	Wallowa	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 180 AC

PROJECT DATES

1974 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene	Acephate
DDT	DDT
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine the effectiveness of aerially applied treatments of Orthene against the Douglas-fir tussock moth for population control and foliage protection. These were compared against DDT sprayed operationally on an adjacent area.

Abstract:

In 1974 the Pacific Northwest Research Station conducted a research field test in Wallowa County, Oregon. Efficacy of acephate at 1.0 and 0.5 lb a.i./2 gal/acre against the Douglas-fir tussock moth was compared to DDT at 0.75 lb a.i./gal/acre on replicated 20-acre plots. A Bell 206 Jet Ranger equipped with a conventional spray boom and T8003 flat fan tips applied the acephate. A Bell 205A-1 applied the DDT using a boom equipped with T8020 flat fan tips. The 1.0 lb acephate treatment resulted in population reductions which were comparable to the DDT treatment; however, the larval knockdown was faster for DDT.

Project Publications and Reports:

Neisess, J., G.P. Markin, and R. Schaefer. 1976. Field evaluations of acephate and dimilin against the Douglas-fir tussock moth. J. Econ. Entomol. 69:783-786.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: John Neisess
 Mailing Address: USDA Forest Service
 Forest Pest Management
 630 Sansome Street
 San Francisco, CA 94111

PROJECT LOCATION

Project Location:	British Columbia	CAN
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 900 AC

PROJECT DATES

1975 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene	Acephate
Dimilin	Diflubenzuron
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To determine the effectiveness of aerially applied treatments of Orthene and Dimilin against the Douglas-fir tussock moth for population control and foliage protection.

Abstract:

In 1975 the Pacific Northwest Research Station conducted a research field test in the Heffley Creek drainage, 15 miles north of Kamloops, British Columbia to determine the effectiveness of aerially applied treatments of Orthene and Dimilin against Douglas-fir tussock moth. A Cessna Ag Truck applied the formulations using a conventional spray boom equipped with T8010 flat fan tips. Both Orthene and Dimilin provided excellent population control and foliage protection.

Project Publications and Reports:

Neisess, J., G.P. Markin, and R. Schaefer. 1976. Field evaluations of acephate and dimilin against the Douglas-fir tussock moth. J. Econ. Entomol. 69:783-786.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: David Graham (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Douglas-fir Tussock Moth

PROJECT LOCATION

Project Location: * OR
 * WA
 Latah & Benewah ID
 (County) (State)

SELECTED INSECTICIDE

Chemical
 Pesticide Name
 DDT
 *
 *
 (brand name) (common name)

Number of treated acres within project boundary:
 426,559 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1974 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To effectively combat outbreaks of Douglas-fir tussock moth.

Abstract:

In June 1974, spraying began on the largest and most controversial all-helicopter aerial forest insect control project ever carried out in the Pacific Northwest. This was a cooperative effort by State and Federal agencies and private timber owners to treat 426,559 acres of tussock moth-infested forest lands in the States of Oregon, Washington, and Idaho with DDT.

Project Publications and Reports:

Almas, D., W. Bousfield, L. Livingston, W. Ludeman. 1975. 1974 North Idaho cooperative Douglas-fir tussock moth control project. Report No. 75-1. State of Idaho, Depart. of Lands, Div. of Forest Mgt., Coeur d'Alene, ID.

Anonymous. 1974. Field report of the 1974 Forest Service DDT - Douglas-fir tussock moth control project. Environmental Protection Agency, Region X, Hazardous Materials Control Div., Pesticides Branch, Seattle, WA.

Chaney, E. 1981. Environmental monitoring program - 1974 cooperative Douglas-fir tussock moth control project - Oregon, Washington, Idaho. Summary Report prepared for USDA Forest Service, Pacific Northwest Region, Portland, OR.

Graham, D.A., J. Mounts, and D. Almas. 1975. 1974 cooperative Douglas-fir tussock moth control project. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Mallory, L.P. 1975. Weather support for the 1974 tussock moth spray operation. National Weather Service, Western Region Headquarters, Salt Lake City, UT.

Mounts, J. 1976. 1974 Douglas-fir tussock moth control project. J. Forestry 74(2):82-86.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jack Mounts (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Okanogan WA
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	Fenitrothion
Sumithion	*
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 11,454 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Determine if a single and double aerial application of fenitrothion will control an outbreak of western spruce budworm. Determine if two aerial applications of fenitrothion will reduce budworm populations and preserve tree foliage significantly better than a single application under operational conditions. Determine the effect of single and double aerial applications of fenitrothion on western spruce budworm parasites. Determine the effect of single and double aerial applications of fenitrothion on non-target organisms, i.e. fish, aquatic invertebrates, and birds.

Abstract:

In 1975 a pilot test for control of western spruce budworm was conducted by the USDA Forest Service on the Wenatchee and Okanogan National Forests, Washington. The chemical Sumithion was aerially applied to 11,454 acres using a Bell 47G3B-1 spray helicopter equipped with Beecomist rotary atomizers.

Project Publications and Reports:

Mounts, J. and D. McComb. 1975. 1975 pilot project of fenitrothion for control of western spruce budworm. USDA Forest Service, Insect and Disease Mgt., State & Private Forestry, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: C.G. Thompson (retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: * WA
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Dipel Bacillus thuringiensis
 Thuricide Bacillus thuringiensis
 * *
 (brand name) (common name)

Number of treated acres within project boundary:
 405 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles & Bals Turbair Spinning Disk

Project Objectives:

To determine application rates and droplet size on the efficacy of B.t. against the western spruce budworm. Also to determine the effects of spray adjuvants to the B.t. formulations. Thuricide was used for the first two objectives and Dipel was used for the last.

Abstract:

In 1975 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test using Bacillus thuringiensis against western spruce budworm. Rotary-wing aircraft equipped with hydraulic nozzles and Bals Turbair spinning disks treated 405 acres in Washington State. The addition of a sticker increased viscosity and spray-droplet size. All treatments significantly reduced budworm populations; but under the test conditions, none of the treatments provided satisfactory population regulation. Foliage protection was greater with Sorbo and Shade formulation than with Sorbo and sticker. The coarser atomizations produced superior spray coverage. Residual activity of the coarse droplets lasted 3 days; but the fine droplets started to degrade immediately. Some information on the effects on natural parasites.

Project Publications and Reports:

Thompson, C.G., J. Neisess, and H.O. Batzer. 1977. Field tests of Bacillus thuringiensis and aerial application strategies on western mountainous terrain. Research Paper PNW-230. USDA Forest Service.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jack Mounts (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Kittitas, Chelan WA
 Okanogan WA
 Warm Springs Reser. OR
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Malathion	Malathion
Sevin 4-Oil	Carbaryl
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 365,702 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1976 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Treat infestation of western spruce budworm using malathion as the primary control agent on the basis of existing efficacy data and a more favorable benefit/cost ratio. Use Sevin 4 Oil on part of the area in order to compare the relative effectiveness of the two chemicals in controlling the spruce budworm.

Abstract:

In 1976 a cooperative control project was conducted by the USDA Forest Service, Washington State Dept. of Natural Resources, and Washington State Dept. of Ecology on Federal, State and private lands in Oregon and Washington. A total of 365,702 acres infested with western spruce budworm were treated with Sevin 4 Oil (7,663 acres) and Malathion (358,039 acres). A total of 28 helicopters and two fixed-wing aircraft was used to apply the insecticide.

Project Publications and Reports:

Anonymous. 1977. 1976 cooperative western spruce budworm control project - Washington-Oregon. USDA Forest Service, Pacific Northwest Region, Portland, Oregon.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jack Mounts (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Kittitas, Chelan WA
 Okanogan WA
 Warm Springs Reserv. OR
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 356,661 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1977 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Protect resources threatened by a western spruce budworm outbreak.

Abstract:

In 1977 a cooperative western spruce budworm control project was conducted by the USDA Forest Service, Washington State Dept. of Natural Resources, and Bureau of Indian Affairs on the Wenatchee and Okanogan National Forests, adjacent private lands in north-central Washington, and Warm Springs Indian Reservation in north-central Oregon. The chemical Sevin 4-Oil was aerially applied to 356,661 acres using rotary-wing aircraft.

Project Publications and Reports:

Mounts, J., R.E. Dolph, D. McComb, and T.F. Gregg. 1978. 1977 cooperative western spruce budworm control program. USDA Forest Service, Region 6, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jack Mounts (Retired)
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Jefferson OR
 Wasco OR
 *
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 34,400 AC

TYPE OF APPLICATION

*

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

*

Project Objectives:

*(Insert up to 10 lines)

Abstract:

*(Insert up to 10 lines)

Project Publications and Reports:

*(Insert up to 10 lines)

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Gary Daterman
 Mailing Address: Pacific NW Res. Station
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location: Warm Springs Reserv. OR
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 200 AC

PROJECT DATES

1980 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical - Pheromone	
Pesticide Name	
E&Z-11-tetradecenal	Pheromone
(In Hercon Flakes)	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Other (Specialized)

Project Objectives:

Determine whether western spruce budworm is affected by a pheromone disruption treatment.

Abstract:

In 1980 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a field test on the Warm Springs Indian Reservation in Oregon using E & Z-11 tetradecenal (in Hercon flakes) against western spruce budworm. Eight plots of 25 acres each were aerially treated using fixed-wing aircraft. At doses of 0, 2, 8, 32, and 128 g/ha traps baited with live females captured 60, 43, 31, 17, and 8 males on average. Disruption reduced male trap response proportionately to dosage. Even the higher doses, however, did not completely suppress response. We note that a female needs only attract one male to successfully mate. Pheromone content of the dispenser formulation declined rapidly during the first week (1/2 gone). Numbers of egg masses produced by caged insects placed in the plots were lower in treated plots than checks. It is encouraging that treatment had apparent effects on the insects but the disruption approach alone may be of limited practical use against western budworm.

Project Publications and Reports:

Daterman, G., L. Sower, and C. Sartwell. Courtship disruption of western spruce budworm by aerial application of synthetic pheromone. 1985. In: Recent Advances in Spruce Budworms Research, Proceedings of the CANUSA Spruce Budworms Research Symposium. C. Sanders, R. Start, E. Mullins, and J. Murphy, eds.; Ottawa, Ontario, pp. 386-387.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Randall F. Perkins(retired)
 Mailing Address: *
 *
 *
 *

PROJECT LOCATION

Project Location:	Grant	OR
	Union	OR
	Umatilla	OR
	(County)	(State)

Number of treated acres within project boundary:
 178,549 AC

PROJECT DATES

1982 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin	Carbaryl
Orthene	Acephate
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To suppress outbreak of western spruce budworm to protect threatened forest resources. Goal - reduce post-spray populations to less than seven insects/100 buds.

Abstract:

In 1982 the USDA Forest Service conducted a western spruce budworm operational project in Grant, Union and Umatilla Counties, Oregon. Carbaryl and acephate were aerially applied to 178,549 acres using helicopters equipped with rotary atomizers. Target population was achieved on most carbaryl blocks. Target population in acephate blocks averaged 9.1 insects/100 buds.

Project Publications and Reports:

Stock, M. and J. Robertson (principal investigators), J. Barry, B. Hostettler, C. Williams (cooperators). 1984. Genetic characteristics of western spruce budworm populations: A validation test of the spray efficacy model (LEM) - Canada/U.S. Spruce Budworms Program--West - Final Report. Department of Forest Resources, University of Idaho, Moscow, ID and USDA Forest Service, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Northwest Region
Randall F. Perkins (retired)
Mailing Address:
*
*
*
*

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Grant OR
* *
* *
(County) (State)

SELECTED INSECTICIDE

Both	
Pesticide Name	
Thuricide 32LV	<u>Bacillus thuringiensis</u>
Zectran	Mexacarbate
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
22,600 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1983 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Pilot test - Thuricide 32LV and Zectran against WSBW.

Abstract:

In 1983 the USDA Forest Service conducted a pilot test in Grant County, Oregon, using Thuricide 32LV and Zectran against western spruce budworm. The pesticides were applied to 22,600 acres using helicopters equipped with rotary atomizers.

Project Publications and Reports:

In-house report - USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Northwest Region
Mailing Address: Randall F. Perkins (retired)
*
*
*
*

PROJECT LOCATION

Project Location: Grant OR
Union OR
Umatilla OR
(County) (State)

Number of treated acres within project boundary:
501,961 AC

PROJECT DATES

1983 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Operational suppression - suppress outbreak of western spruce budworm to protect threatened forest resources. Post-spray target population was 1.5 or less insects/45 cm branch.

Abstract:

In 1983 the USDA Forest Service conducted an operational suppression project against the western spruce budworm in Grant, Union, and Umatilla Counties, Oregon. Helicopters equipped with rotary atomizers applied Sevin to 501,961 acres.

Project Publications and Reports:

In-house report - USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Northwest Station
Mailing Address: Roy C. Beckwith
USDA Forest Service
Forestry Sciences Lab
3200 Jefferson Way
Corvallis, OR 97331

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Crook OR
* *
* *
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Thuricide 32LV
SAN 415 32LV
*
(brand name)

Bacillus thuringiensis
Bacillus thuringiensis
*
(common name)

Number of treated acres within project boundary:
800 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1984 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Primary objective was to compare the efficacy of two commercial strains of B.t. (HD-1; NRD-12) applied by helicopter at two different dosages under normal eastern Oregon field conditions.

Abstract:

In 1984 the Forestry Sciences Laboratory, Corvallis, Oregon conducted a research field test in Crook County, Oregon. Thuricide 32LV and SAN 415 32LV (Bacillus thuringiensis) were applied by helicopter at 20 and 30 BIU's in a spray volume of 7.1 l/ha to 800 acres infested with western spruce budworm. The 30 BIU per ha dosage provided better population control than the 20 BIU dosage for both isolates; however, only the difference between dosages for SAN 415 was significant. The application of B.t. improved foliage protection by 15 to 25 percent compared to untreated checks. The number of days before spray residues declined to 50 percent of original activity varied with dosage; however, the inactivity rates of the four treatments were approximately equal. Therefore, the success of the control program depends upon the initial rate of B.t. mortality.

Project Publications and Reports:

Beckwith, R., M. Stelzer, and B. Hostetler. 1986. Field testing of two isolates of Bacillus thuringiensis against the western spruce budworm - a progress report. USDA Forest Service, Forestry Sciences Laboratory, Corvallis, OR.

Beckwith, R.C. and M.J. Stelzer. 1987. Persistence of Bacillus thuringiensis in two formulations applied by helicopter against the western spruce budworm (Lepidoptera:Tortricidae) in North Central Oregon. J. Econ. Entomol. 80:204-207.

Niwa, C.G., M.J. Stelzer, and R.C. Beckwith. 1987. Effects of Bacillus thuringiensis on parasites of western spruce budworm (Lepidoptera:Tortricidae). J. Econ. Entomol. 80:750-753.

Stelzer, M.J. and R.C. Beckwith. 1988. Comparison of two isolates of Bacillus thuringiensis in a field test on western spruce budworm (Lepidoptera:Tortricidae). J. Econ. Entomol. 81:880-886.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Wash. Dept. of Natural Res.
Agency: *

Project Director: Rick Johnsey

Mailing Address: Wash. Dept. of Natural Res.
Forest Health, MQ-11
Olympia, WA 98504
*

TARGET PEST

Other - Hemlock Sawfly

PROJECT LOCATION

Project Location: Pacific WA
* *
* *
(County) (State)

SELECTED INSECTICIDE

Chemical
Pesticide Name
Sevin 4-Oil Carbaryl
Orthene Acephate
* *
(brand name) (common name)

Number of treated acres within project boundary:
100 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1984 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To test the efficacy of Orthene and Sevin 4-Oil for control.

Abstract:

In 1984 the Washington Department of Natural Resources conducted a research field test in Pacific County, Washington, to test the efficacy of Orthene and Sevin 4-Oil for control of the hemlock sawfly. A helicopter was used to apply the insecticides to approximately 100 acres.

Project Publications and Reports:

Johnsey, R. 1984. Field test of two insecticides to control hemlock sawfly. WDNR Field Note 43, Olympia, WA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Iral Ragenovich
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

PROJECT LOCATION

Project Location:	Grant	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 40,956 AC

PROJECT DATES

1985 (year)

PROJECT CLASSIFICATION

Other - Operational Eval.

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Thuricide 32LV
 Thuricide 48LV
 Dipel 8L
 (brand name)

Bacillus thuringiensis
Bacillus thuringiensis
Bacillus thuringiensis
 (common name)

TYPE OF APPLICATION

Both

TYPE OF AIRCRAFT

Both

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Evaluate diluted and undiluted B.t. formulations for ability to obtain post treatment density of less than 1 budworm/45 cm sample branch. Evaluate helicopters and agricultural (single engine) fixed-wing aircraft for application effectiveness.

Abstract:

During June and July of 1985 an operational evaluation was conducted using both diluted and undiluted formulations of Bacillus thuringiensis against the western spruce budworm. An Ayers Turbo Thrush equipped with Unimizer atomizers and a Hiller 12E Soley equipped with Beecomist atomizers were used to treat 40,956 acres on the Malheur National Forest in Oregon.

Project Publications and Reports:

Anonymous. Synopsis of the 1985 western spruce budworm operational evaluation using Bacillus thuringiensis on the Malheur National Forest, Oregon, 2 pp.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Boise Cascade Corporation
 Agency: *
 Project Director: *
 Mailing Address: Boise Cascade Corporation
 P.O. Box 610
 LaGrande, OR 97850
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Union OR
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 13,202 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1986 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To protect forest resources threatened by western spruce budworm outbreak.

Abstract:

In 1986 Boise Cascade Corporation conducted an aerial spray project against the western spruce budworm in Union County, Oregon. Sevin 4-Oil was applied to 13,202 acres using helicopters equipped with rotary atomizers.

Project Publications and Reports:

None Available.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Roy C. Beckwith
 Mailing Address: Forestry Sciences Lab
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location:	Harney	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 360 AC

PROJECT DATES

1987 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	Dipel 6L
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Both

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Primary objective was two-fold (1) to compare the efficacy of Dipel 6L at two different dosages and (2) to compare a diluted formulation against an undiluted one at the higher dosage.

Abstract:

In 1987 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test in Harney County, Oregon to test Dipel 6L against western spruce budworm. The Bacillus thuringiensis was applied to 360 acres using a helicopter equipped with rotary atomizers. Results were poor primarily because of apparent poor coverage by the spray deposit. The undiluted material would not flow properly through the aircraft spray system especially at the low temperatures experienced in the early morning hours. The pilot reported that the fine droplets appeared to hang in the air and disperse before they could settle on the target. Weather patterns can cause inversions that would produce conditions not suited to good spray coverage on small acreages used in our test.

Project Publications and Reports:

Beckwith, R.C. 1987. Field test of Bacillus thuringiensis against the western spruce budworm in 1987; A progress report. Corvallis, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Bill Butler
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location:	Grant	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 94,500 AC

PROJECT DATES

1987 (year)

PROJECT CLASSIFICATION

Operational Project

Project Objectives:

To suppress outbreak of western spruce budworm to protect threatened forest resources. Target - one or fewer insects/45 cm branch.

Abstract:

In 1987 the USDA Forest Service conducted an operational project in Grant County, Oregon against the western spruce budworm. Dipel 6L (B.t.) was applied to 94,500 acres using both fixed and rotary-wing aircraft equipped with rotary atomizers. Target population reduction was approximately one on 34,500 acres. The remainder had higher populations. Serious problems attributable to formulation.

Project Publications and Reports:

Anonymous. 1987. Western spruce budworm 1987 operations manual - 1987 western spruce budworm spray project - Malheur and Wenatchee National Forests. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Hadfield, J. 1987. Review of the 1987 Pacific Northwest Region, western spruce budworm suppression project, In-Service Report - Critique. Forest Pest Management, R-6, Portland, OR.

Wiitala, M.R. 1989. Analysis of western spruce budworm application costs during 1987 and 1988 suppression projects. Report No. R6-89-04. USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Ben Siminoe
 Mailing Address: USDA Forest Service
 Humboldt National Forest
 976 Mountain City Highway
 Elko, NV 89801

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Yakima WA
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE
Biological

Pesticide Name
 Thuricide 48LV
 *
 *
 (brand name)

Bacillus thuringiensis
 *
 *
 (common name)

Number of treated acres within project boundary:
 44,152 AC

TYPE OF APPLICATION
Diluted**PROJECT DATES** 1987 (year)**TYPE OF AIRCRAFT**
Rotary-Wing**PROJECT CLASSIFICATION**

Operational Project

SPRAY SYSTEM
Rotary Atomizers

Project Objectives:

To protect threatened forest resources from unacceptable damage caused by a western spruce budworm outbreak on the Wenatchee NF. Target - one or less larvae/45 cm branch.

Abstract:

In 1987 the USDA Forest Service conducted an operational project on the Wenatchee National Forest, Washington, to combat the western spruce budworm. Bacillus thuringiensis (Thuricide 48LV) was applied to 44,152 acres using helicopters equipped with rotary atomizers. Target population of one or less larvae/45 cm branch was achieved.

Project Publications and Reports:

Anonymous. 1987. Western spruce budworm 1987 operations manual - 1987 western spruce budworm spray project - Malheur and Wenatchee National Forests. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Wiitala, M.R. 1989. Analysis of western spruce budworm application costs during 1987 and 1988 suppression projects. Report No. R6-89-04. USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Longview Fibre Corp.
 Agency: *
 Project Director: Stan Benson
 Mailing Address: Longview Fibre Corp.
 P.O. Box 665
 Bingen, WA 98605
 *

PROJECT LOCATION

Project Location: Hood River OR
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 40,684 AC

PROJECT DATES

1988 (year)

PROJECT CLASSIFICATION

Operational Project

Project Objectives:

To protect resources threatened by a western spruce budworm outbreak. Reduce western spruce budworm below one insect/45 cm branch.

Abstract:

In 1988 Longview Fibre Corporation conducted an operational project in Hood River County, Oregon against the western spruce budworm. Carbaryl (Sevin 4-Oil) and Bacillus thuringiensis (Thuricide 32LV) were applied to 40,684 acres using a helicopter equipped with rotary atomizers.

Project Publications and Reports:

Overhulser, D.L. 1988. Final report and critique of the 1988 Longview Fibre/Hood River County western spruce budworm spray project. Oregon State Dept. of Forestry, Salem, OR.

=====

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Both	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Thuricide 32LV	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

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AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Woody Williams
 Mailing Address: USDA Forest Service
 Fire & Aviation Management
 P.O. Box 96090
 Washington, D.C. 20090-6090

PROJECT LOCATION

Project Location: Hood River, Wasco OR
 Clackamas, Jefferson OR
 Umatilla OR
 (County) (State)

Number of treated acres within project boundary:
 425,676 AC

PROJECT DATES

1988 (year)

PROJECT CLASSIFICATION

Operational Project

Project Objectives:

To suppress outbreak of western spruce budworm to protect threatened forest resources. Population target - one or less insects/45 cm branch.

Abstract:

In 1988 the USDA Forest Service conducted an operational project in Hood River, Clackamas, Jefferson, Wasco, and Umatilla Counties, Oregon, against the western spruce budworm. Undiluted Bacillus thuringiensis (Thuricide 32LV) was applied to 425,676 acres using both fixed-wing and rotary-wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

Wiitala, M.R. 1989. Analysis of western spruce budworm application costs during 1987 and 1988 suppression projects. Report No. R6-89-04. USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: Boise Cascade Corporation
*
Project Director: *
Mailing Address: Boise Cascade Corporation
P.O. Box 610
LaGrande, OR 97850
*

PROJECT LOCATION

Project Location: Union OR
* *
* *
(County) (State)

Number of treated acres within project boundary:
12,500 AC

PROJECT DATES

1988 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To protect forest resources threatened by a western spruce budworm outbreak.

Abstract:

In 1988 Boise Cascade Corporation conducted an operational project in Union County, Oregon, against the western spruce budworm. Carbaryl (Sevin 4-Oil) was applied to 12,500 acres using helicopters equipped with rotary atomizers.

Project Publications and Reports:

None available.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or NOVO Laboratories, Inc.
 Agency: Danbury, CT 06813-1907
 Project Director: Paul E. Buffam
 Mailing Address: 7270 S.W. Wilson Avenue
 Beaverton, OR 97005
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Deschutes OR
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Foray 48B
 * *
 (brand name) Bacillus thuringiensis
 * *
 (common name)

Number of treated acres within project boundary:
 300 AC

TYPE OF APPLICATION

Undiluted

PROJECT DATES

1988 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Other

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Evaluate effectiveness of an undiluted application of Foray 48B in reducing western spruce budworm populations to non-damaging levels.

Abstract:

In 1988 a test was conducted near Sisters, Oregon by Novo Laboratories to evaluate the effectiveness of Foray 48B in reducing populations of western spruce budworm. The test was conducted on land owned and managed by Willamette Industries, Inc. A single application of undiluted Foray 48B was applied to approximately 300 acres of forested land using a Bell 206 helicopter equipped with six Beecomist rotary atomizers. A similar adjacent area was left unsprayed to serve as a check.

Project Publications and Reports:

Buffam, P.E. and J.D. Buffam. 1988. Results of a test to evaluate the effectiveness of Foray 48B against the western spruce budworm in Oregon in 1988. Pestechon, Inc., Lakeworth, FL.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Larry Stipe
 Mailing Address: USDA Forest Service
 Coop. Forest & Pest Mgt.
 Fed. Bldg., P.O. Box 7669
 Missoula, MT 59807

PROJECT LOCATION

Project Location:	Umatilla	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 57,708 AC

PROJECT DATES

1988 (year)

PROJECT CLASSIFICATION

Pilot Test

Project Objectives:

To evaluate 1/3 gallon application rate of Thuricide 48LV and Dipel 6AF at 16 BIU's for control of western spruce budworm. Target - one or less insects/45 cm branch.

Abstract:

In 1988 a pilot project was conducted on the Umatilla National Forest, Oregon to evaluate undiluted Thuricide 48LV and Dipel 6AF for control of western spruce budworm. The Bacillus thuringiensis was applied to 57,708 acres using Hiller 12E Soloy's equipped with six Beecomist rotary atomizers.

Project Publications and Reports:

Stipe, L. 1988. Western spruce budworm, Meacham pilot project - Operations report, Umatilla National Forest. USDA Forest Service, Pacific Northwest Region, Umatilla National Forest, Pendleton, OR.

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	
Thuricide 48LV	<u>Bacillus thuringiensis</u>
Dipel 6AF	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
Agency: Pacific Northwest Region
Project Director: George Berscheid (Retired)
Mailing Address: *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Wasco OR
* *
* *
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 6L
*
*
(brand name)

Bacillus thuringiensis
*
*
(common name)

Number of treated acres within project boundary:
115.034 AC

TYPE OF APPLICATION

Undiluted

PROJECT DATES 1988 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Evaluate procedures needed to successfully aerially apply the oil formulation Dipel 6L for control of western spruce budworm. Target - one or less insects/45 cm branch.

Abstract:

In 1988 the USDA Forest Service conducted a pilot test in Wasco County, Oregon, for control of western spruce budworm. Dipel 6L was aerially applied to 115,034 acres using both helicopters and fixed-wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

In preparation.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Northwest Region
George Berscheid (Retired)
Mailing Address:
*
*
*
*

PROJECT LOCATION

Project Location: Wasco OR
* *
* *
(County) (State)

Number of treated acres within project boundary:
6,000 AC

PROJECT DATES

1988 (year)

PROJECT CLASSIFICATION

Other - Feasibility Study

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 6L
*
*
(brand name) Bacillus thuringiensis
*
*
(common name)

TYPE OF APPLICATION

Undiluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To evaluate on an operational scale the feasibility of ULV application (42.7 oz/acre) of Dipel 6L to control western spruce budworm.

Abstract:

Concurrent with the 1988 Region 6 western spruce budworm control project, the USDA Forest Service evaluated on an operational scale the feasibility of ULV application of Bacillus thuringiensis to control western spruce budworm. Dipel 6L was applied to 6,000 acres on the Mt. Hood National Forest in Oregon, using a Bell 206 helicopter equipped with rotary atomizers.

Project Publications and Reports:

Sandquist, R., G. Berscheid, B. Hostetler, I. Ragenovich, J. Cota, C. Smith-Dixon, R. Beckwith, S. Howes, J. Barry, and Abbott Laboratories. 1988. Technical evaluation plan - Dipel 6L special project, Pacific Northwest Region - 1988. FPM Report 88-7. USDA Forest Service, Forest Pest Management, Davis, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Art Webber
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location: Clackamas OR
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 7,454 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	
Dipel 6L	<u>Bacillus thuringiensis</u>
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Protect resources threatened by western spruce budworm outbreak. Target - one or less insects/45 cm branch.

Abstract:

In 1989 the USDA Forest Service conducted an aerial spray project against western spruce budworm in Clackamas County, Oregon. Dipel 6L was applied to 7,454 acres using a helicopter equipped with rotary atomizers. Target not achieved overall. Reasons unknown.

Project Publications and Reports:

In preparation.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Boise Cascade Corporation
 Agency: *
 Project Director: *
 Mailing Address: Boise Cascade Corporation
 P.O. Box 51
 Yakima, WA 98907
 *

PROJECT LOCATION

Project Location:	Yakima	WA
	*	*
	*	*
	(County)	(State)

Number of treated acres within project boundary:
 2,000 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Protect forest resources threatened by western spruce budworm outbreak.

Abstract:

In 1989 Boise Cascade Corporation conducted an aerial spray project in Yakima County, Washington, to control western spruce budworm. Sevin 4-Oil was applied to 2,000 acres using a helicopter equipped with rotary atomizers.

Project Publications and Reports:

None available.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Roy Beckwith & Dave Grimble
 Mailing Address: Forest Sciences Laboratory
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location:	Wallowa	OR
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 600 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	<u>Bacillus thuringiensis</u>
Condor AF	
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

The primary objective was to compare three different dosages of a new strain of B.t. (Condor AF) while holding the spray volume constant at 4.7 l/ha.

Abstract:

In 1989 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test on 600 acres in Wallowa County, Oregon to compare three different dosages of Condor AF against western spruce budworm. A helicopter equipped with rotary atomizers was used to apply the B.t. The three dosages and an untreated check were replicated five times in a random block design. Each day, only one block containing each of the treatments was sprayed to insure that all treatments were basically under the same weather conditions. The results were poor in that there was no significant difference between any of the treatments and the untreated checks. The tank water was lab tested against distilled water in the lab using three different B.t. products to determine if the water inactivated the B.t. organism and/or toxin. In all cases there was no significant difference and the percent kill was very high ruling out water source as the problem. The company thought that the formulation may have encapsulated the active material under our western weather conditions. The problem is still trying to be resolved.

Project Publications and Reports:

Beckwith, R.C. and D.G. Grimble. 1989. Field efficacy of a new strain of Bacillus thuringiensis compared at different dosages against the western spruce budworm. An unpublished inhouse report. Due to confidentiality agreement, all requests for this report should be directed to Ecogen.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: James S. Hadfield
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

PROJECT LOCATION

Project Location:	Baker	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 5,128 AC

PROJECT DATES

1989 (year)

PROJECT CLASSIFICATION

Pilot Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	<u>Bacillus thuringiensis</u>
Foray 48B	
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Evaluate 1/3 and 1/2 gal/acre undiluted applications of Foray 48B for effectiveness in reducing western spruce budworm outbreaks.

Abstract:

In 1989 the USDA Forest Service conducted a pilot test in Baker County, Oregon, to evaluate the effectiveness of two application rates of undiluted Foray 48B against western spruce budworm. Helicopters equipped with rotary atomizers were used to treat 5,128 acres.

Project Publications and Reports:

In preparation.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Council of Forest Indus.
 Agency: & British Columbia Province
 Project Director: *
 Mailing Address: Council of Forest Indus.
 Vancouver, B.C., CANADA
 *
 *

PROJECT LOCATION

Project Location: Vancouver Island, BC CAN
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 28,800 AC

PROJECT DATES

1973 (year)

PROJECT CLASSIFICATION

Operational Project

TARGET PEST

Other - Blackheaded Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sumithion	Fenitrothion
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

*

Project Objectives:

To protect trees in certain designated stands from further defoliation.

Abstract:

In June 1973 an aerial spray project was conducted by the Council of Forest Industries of British Columbia and the Province of British Columbia to protect 28,800 acres of hemlock forest on northern Vancouver Island from additional defoliation by blackheaded budworm. Sumithion (fenitrothion) was applied using a Grumman Avenger (TBM).

Project Publications and Reports:

Carrow, J.R., Editor. 1974. Aerial spraying operations against blackheaded budworm on Vancouver Island -1973. Information Report BC-X-101. Pacific Forest Research Centre, Victoria, B.C.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or British Columbia F.S.
 Agency: & USDA Forest Service (PNW)
 Project Director: Dr. M.J. Stelzer (retired)
 Mailing Address:
 *
 *
 *
 *

PROJECT LOCATION

Project Location: Kamloops, B.C. CAN
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 2,647 AC

PROJECT DATES

1975 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Biological	
Pesticide Name	
NPV	Baculovirus
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To verify the 1973 virus tests in Oregon on a larger scale and to compare three virus stocks formulated in molasses and non-molasses tank mixes and to compare 1 and 2 gal/acre application rates.

Abstract:

In 1975 the British Columbia Forest Service and USDA Forest Service, Pacific Northwest Research Station conducted a research field test in Kamloops, British Columbia. Aerial application of three baculovirus stocks were tested against the Douglas-fir tussock moth. The NPV was applied to 2,647 acres using fixed-wing aircraft equipped with hydraulic nozzles. A dosage of 100 billion polyhedra/acre, formulated in molasses and non-molasses formulations and applied at 1 or 2 gal/acre provided population control and foliage protection. Larvae collected from the treated areas after 5 days showed virus infection rates that ranged from 60-87 percent. Population densities were reduced by more than 90 percent at 21 days post-treatment. No evidence of survival to the pupal stage was found in any of the treated areas.

Project Publications and Reports:

Stelzer, M., J. Neisess, J.C. Cunningham, and J.R. McPhee. 1977. Field evaluation of baculovirus stocks against Douglas-fir tussock moth in British Columbia.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Canadian Forestry Service
 Agency: *

Project Director: Northern Forest Res. Centre
 Mailing Address: Environment Canada
 5320 - 122 Street
 Edmonton, Alberta
 CANADA T6H 3S5

TARGET PEST

Other - Forest Tent Caterpillar

PROJECT LOCATION

Project Location: Alberta, B.C. CAN
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological	
Pesticide Name	
NPV	Baculovirus
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 * AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1978 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To evaluate the effectiveness of aerial applications of a naturally occurring nuclear polyhedrosis virus in controlling infestations of forest tent caterpillar.

Abstract:

In 1978 the Canadian Forestry Service conducted the first in a series of small scale experiments using the nuclear polyhedrosis virus near Sundance, Alberta. Various concentrations of the virus were applied to forest tent caterpillar infested aspen using a Bell 47-G3-B1 helicopter fitted with saddle tanks and a 12-m boom equipped with 26 Diaphragm TeeJet nozzles (D8-45).

Project Publications and Reports:

Ives, W.G.H., J.A. Muldrew, and R.M. Smith. 1982. Experimental aerial application of forest tent caterpillar baculovirus. Information Report NOR-X-240. Minister of Supply and Services Canada 1982 - Catalogue No. FO46-12/240E. Northern Forest Research Centre, Canadian Forestry Service, Environment Canada., Edmonton, Alberta, Canada.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Canadian Forestry Service
 Agency: *

Project Director: Northern Forest Res. Centre
 Mailing Address: Environment Canada
 5320 - 122 Street
 Edmonton, Alberta
 CANADA T6H 3S5

TARGET PEST

Other - Forest Tent Caterpillar

PROJECT LOCATION

Project Location: Alberta, B.C. CAN
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological	
Pesticide Name	.
NPV	Baculovirus
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:

* AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To evaluate the effectiveness of aerial applications of a naturally occurring nuclear polyhedrosis virus in controlling infestations of forest tent caterpillar.

Abstract:

In 1979 the Canadian Forestry Service conducted the second in a series of small scale experiments using the nuclear polyhedrosis virus to control the forest tent caterpillar. The 1979 experiments were conducted near Flatbush, Buford, and Partridge Hill in Alberta, B.C. Various concentrations of the virus were applied to forest tent caterpillar infested aspen using a Bell 47G3-B1 helicopter fitted with saddle tanks and a 12-m boom equipped with 26 Diaphragm TeeJet nozzles (D8-45).

Project Publications and Reports:

Ives, W.G.H., J.A. Muldrew, and R.M. Smith. 1982. Experimental aerial application of forest tent caterpillar baculovirus. Information Report NOR-X-240. Minister of Supply and Services Canada 1982 - Catalogue No. F046-12/240E. Northern Forest Research Centre, Canadian Forestry Service, Environment Canada, Edmonton, Alberta, Canada.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Canadian Forestry Service
 Agency: *

Project Director: Northern Forest Res. Centre
 Mailing Address: Environment Canada
 5320 - 122 Street
 Edmonton, Alberta
 CANADA T6H 3S5

TARGET PEST

Other - Forest Tent Caterpillar

PROJECT LOCATION

Project Location: Alberta, B.C. CAN
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological	
Pesticide Name	
NPV	Baculovirus
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 * AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1980 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To evaluate the effectiveness of aerial applications of a naturally occurring nuclear polyhedrosis virus in controlling infestations of forest tent caterpillar.

Abstract:

In 1980 the Canadian Forestry Service conducted the third in a series of small scale experiments using the nuclear polyhedrosis virus. The 1980 tests were conducted near Sundance, Alberta. Various concentrations of the virus were applied to forest tent caterpillar infested aspen using a Bell 47G3-B1 helicopter fitted with saddle tanks and a 12-m boom equipped with 26 Diaphragm TeeJet nozzles (D8-45).

Project Publications and Reports:

Ives, W.G.H., J.A. Muldrew, and R.M. Smith. 1982. Experimental aerial application of forest tent caterpillar baculovirus. Information Report NOR-X-240. Minister of Supply and Services Canada 1982 - Catalogue No. F046-12/240E. Northern Forest Research Centre, Canadian Forestry Service, Environment Canada, Edmonton, Alberta, Canada.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Lonne Sower
 Mailing Address: Forestry Sciences Lab
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location: Kamloops, B.C. CAN
 * *
 * *
 (County) (State)

Number of treated acres within project boundary:
 120 AC

PROJECT DATES

1981 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Chemical - Pheromone
 Pesticide Name
 Z-6-heneicosen-11-one Pheromone
 in Sentry fibers *
 * *
 (brand name) (common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Other - Specialized

Project Objectives:

To test pheromone disruption against a high level Douglas-fir tussock moth population.

Abstract:

In 1981 the Forestry Sciences Laboratory, Corvallis, Oregon, conducted a research field test in Kamloops, British Columbia, Canada, to test DFTM pheromone disruption. Hollow fibers containing synthetic pheromone were applied by helicopter to six plots of about 8 ha each. Douglas-fir tussock moth had reached such high levels on the plots that trees in some areas were completely defoliated. Reproduction of the moths was reduced 71 to 81% respectively at dosages of 8 and 25 g of pheromone/ha (3 and 10 gal/acre) relative to reproduction in untreated check plots.

Project Publications and Reports:

Sower, L., G. Daterman, W. Funkhouser, and C. Sartwell. 1983. Pheromone disruption controls Douglas-fir tussock moth (Lepidoptera:Lymantriidae) reproduction at high insect densities. Canadian Entomologist 115:966-69.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: George P. Markin
Mailing Address: USDA Forest Service
Institute of Pac. Islands
1151 Punchbowl St. Rm 323
Honolulu, HI 96813

TARGET PEST

Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location:	Kittitas	WA
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene	Acephate
Sevin 4-Oil	Carbaryl
Dylox	Trichlorfon
(brand name)	(common name)

Number of treated acres within project boundary:
150 AC

TYPE OF APPLICATION

Both

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Evaluate three insecticides (Sevin 4-Oil, Dylox 1.5, and Orthene 75S) to determine their field life against Douglas-fir tussock moth. Susceptibility of different larval instars to Orthene was also studied.

Abstract:

In 1975 the USDA Forest Service conducted a series of field tests on the Wenatchee National Forest, Washington, to evaluate three chemical insecticides (Sevin 4-Oil, Dylox 1.5, and Orthene 75S) against the Douglas-fir tussock moth. All applications were made using a Hiller 12E helicopter equipped with T8002 flat fan nozzle tips.

Project Publications and Reports:

Markin, G.P., J.W. Brewer, and H.O. Batzer. 1978. Field life of Orthene, Sevin-4-Oil, and Dylox 1.5 bioassay with Douglas-fir tussock moth larvae. Research Note PNW-313. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Markin, G.P. 1982. Drift of insecticidal spray by cold air drainage winds in western mountains. Research Note PSW-360. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA 94701.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: Patrick Shea
 Mailing Address: USDA Forest Service
 2121C Second Street
 Davis, CA 95616

TARGET PEST

Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location:	Union	OR
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Dylox	Trichlorfon
Sevin 4-Oil	Carbaryl
DDT	DDT
(brand name)	(common name)

Number of treated acres within project boundary:
 750 AC

TYPE OF APPLICATION

Both

PROJECT DATES

1974 (year)

TYPE OF AIRCRAFT

Rotary-wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To compare the effects of DDT, carbaryl, and trichlorfon formulations applied 4 days after 70 percent of the egg masses had started to hatch in terms of (a) immediate suppression of Douglas-fir tussock moth populations, and (b) preservation of the new (current year's) foliage.

Abstract:

In 1974 the USDA Forest Service conducted a research field test near Troy and Halfway, Oregon. Carbaryl and trichlorfon were tested against Douglas-fir tussock moth in undiluted formulations, with DDT (diluted in diesel fuel) as the "field standard." The insecticides were applied by a Bell 206 Jet Ranger equipped with TeeJet Nozzles with 8002 nozzle tips.

Project Publications and Reports:

Williams, Jr., C.B., G.P. Markin, and P.J. Shea. 1978. Effects of carbaryl, trichlorfon, and DDT on collapsing Douglas-fir tussock moth populations in Oregon. Research Note PSW-334. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George P. Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Gem ID

SELECTED INSECTICIDE

Chemical
 Pesticide Name
 Lannate Methomyl

(County) (State)

(brand name) (common name)

Number of treated acres within project boundary:
 900 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1978 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To test the effectiveness of various application rates of the insecticide Lannate (methomyl) against western spruce budworm.

Abstract:

In 1978 the USDA Forest Service conducted aerial field tests in Gem County, Idaho, to test the effectiveness of various application rates of the insecticide Lannate (methomyl) against western spruce budworm. Application was by a small helicopter (Bell 47 or Hiller 12E) equipped with 8002 Spraying Systems flat fan tips.

Project Publications and Reports:

Markin, G.P. and D.R. Johnson. 1986. Aerial field tests of five insecticides on western spruce budworm in Idaho and Montana, 1978-1980. Research Note PSW-385. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Southwest Station
Carroll Williams (retired)
Mailing Address:
*
*
*
*

TARGET PEST

Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location: Okanogan WA
Union OR
* *
(County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Zectran	Mexacarbate
Pyrethrum	Pyrethrins
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
1,645 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1972 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To test the effectiveness of mexacarbate and stabilized pyrethrins formulations on field populations of Douglas-fir tussock moth larvae.

Abstract:

In 1972 the USDA Forest Service conducted field tests near Oroville and Riverside, Washington, and near LaGrande, Oregon, using mexacarbate and stabilized pyrethrins against Douglas-fir tussock moth. The insecticides were applied using a Bell 47G-3 equipped with conventional boom and nozzle spray system. The pyrethrins were delivered through 29 nozzles equipped with 8015 tips. The mexacarbate was sprayed through 22 nozzles equipped with 8003 tips.

Project Publications and Reports:

Williams, Jr., C.B., P.J. Shea, B. Maksymiuk, J.A. Neisess, and D. McComb. 1978. Research Note PSW-332. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Calif. Dept. of Food & Ag.
Agency: *

Project Director: Harry Kaya
Mailing Address: University of California
Dept. of Nematology
Davis, CA 95616
*

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location: Santa Barbara CA
* *
* *
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 4L
*
*
(brand name) Bacillus thuringiensis
*
*
(common name)

Number of treated acres within project boundary:
10,240 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1983 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Other - Eradication

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Eradication of gypsy moth infestation.

Abstract:

In 1983 the California Department of Food and Agriculture conducted a gypsy moth eradication project in Santa Barbara County, California. Application by helicopter of the microbial insecticide Bacillus thuringiensis (Dipel 4L) and ground application of the chemical insecticide carbaryl (Sevin 80S) were the initial components of the eradication strategy.

Project Publications and Reports:

Brown, L.R., H.K. Kaya, R.C. Reardon, and R.A. Fusco. 1984. The Santa Barbara gypsy moth eradication effort. California Agriculture, Vol. 38, pp. 4-7.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George P. Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813

PROJECT LOCATION

Project Location:	Meagher	MT
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 720 AC

PROJECT DATES

1979 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Test the efficacy of carbaryl on western spruce budworm at lower dosage rates.

Abstract:

In 1979 the USDA Forest Service conducted an aerial field test north of the community of White Sulphur Springs in western Montana to determine the effectiveness of lower dosage rates of the insecticide carbaryl (Sevin 4-Oil) against the western spruce budworm. Each of the three dosage rates was applied to five 20-hectare plots by a helicopter equipped with Beecomist rotary atomizers.

Project Publications and Reports:

Markin, G.P. and D.R. Johnson. 1979. Carbaryl applied at reduced dosage rates for control of western spruce budworm. Research Paper PSW-170. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George P. Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Kittitas	WA
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Dylox 1.5	Trichlorfon
Orthene	Acephate
(brand name)	(common name)

Number of treated acres within project boundary:
 290 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Both

Project Objectives:

Test the effectiveness of three insecticides at two droplet sizes for control of western spruce budworm and Douglas-fir tussock moth.

Abstract:

In 1975 the USDA Forest Service conducted a series of tests on the Wenatchee National Forest, Washington, to compare a rotary atomizer system (spinning disc atomizers) that produces a small droplet with a conventional hydraulic system (T8002 flat fan tips) that applies larger droplets for control of both the Douglas-fir tussock moth and the western spruce budworm. Three insecticides (carbaryl, acephate, and trichlorfon) were applied using a Hiller 12E helicopter.

Project Publications and Reports:

Markin, G.P., H.O. Batzer, and J.W. Brewer. 1978. Effectiveness of three insecticides applied at two droplet sizes for control of the Douglas-fir tussock moth and western spruce budworm. Research Note PNW-321. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George P. Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813

TARGET PEST

Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location:	Kittitas	WA
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Dylox 1.5	Trichlorfon
Orthene	Acephate
(brand name)	(common name)

Number of treated acres within project boundary:
 290 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Both

Project Objectives:

Test the effectiveness of three insecticides at two droplet sizes for control of western spruce budworm and Douglas-fir tussock moth.

Abstract:

In 1975 the USDA Forest Service conducted a series of tests on the Wenatchee National Forest, Washington, to compare a rotary atomizer system (spinning disc atomizers) that produces a small droplet with a conventional hydraulic system (T8002 flat fan tips) that applies larger droplets for control of both the Douglas-fir tussock moth and the western spruce budworm. Three insecticides (carbaryl, acephate, and trichlorfon) were applied using a Hiller 12E helicopter.

Project Publications and Reports:

Markin, G.P., H.O. Batzer, and J.W. Brewer. 1978. Effectiveness of three insecticides applied at two droplet sizes for control of the Douglas-fir tussock moth and western spruce budworm. Research Note PNW-321. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: John S. Hard
 Mailing Address: USDA Forest Service
 Institute Northern Forestry
 308 Tanana Drive
 Fairbanks, AK 99775-5500

PROJECT LOCATION

Project Location: Union OR
 * *
 * *
 (County) (State)

TARGET PEST

Other - Larch Casebearer

Number of treated acres within project boundary:
 150 AC

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Orthene	Acephate
*	*
*	*
(brand name)	(common name)

PROJECT DATES 1976 (year)

TYPE OF APPLICATION

Diluted

PROJECT CLASSIFICATION

Research Field Test

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Test the efficacy of acephate to control larch casebearer.

Abstract:

In 1976 the USDA Forest Service conducted a research field test near LaGrande, Oregon, to determine whether Orthene applied aerially at a rate of 0.5 lb a.i./gal/acre would reduce, but not annihilate larch casebearer larval populations, and would protect host trees from heavy defoliation the following spring. The insecticide was applied using a Bell 206 Jet Ranger equipped with a detachable belly tank with conventional boom and 43 evenly-spaced flat fan T8002 tips.

Project Publications and Reports:

Hard, J.S., S. Meso, and M. Haskett. 1979. Testing aerially applied Orthene for control of larch casebearer. Research Paper PSW-138. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Intermountain Station
 Project Director: Richard I. Washburn
 Mailing Address:
 *
 *
 *
 *

TARGET PEST

Other - Larch Casebearer

PROJECT LOCATION

Project Location: Farragut State Park ID
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Chemical		
Pesticide Name		
Orthene 75-S	Acephate	
*	*	
*	*	
(brand name)	(common name)	

Number of treated acres within project boundary:
 60 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1975 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Test the efficacy of acephate to control larch casebearer.

Abstract:

In 1975 the Intermountain Forest and Range Experiment Station in cooperation with Potlatch Forests, Inc., Idaho Department of Lands, and Pacific Northwest Forest and Range Experiment Station conducted a research field test at Farragut State Park, Idaho, to determine the effectiveness of Orthene 75-S against the larch casebearer. Treatments were made with a Bell 47G-3B-2 helicopter using a hydraulic spray system with 32 8002 flat fan nozzles.

Project Publications and Reports:

Washburn, R.I., R.L. Livingston, and G.P. Markin. 1977. An aerial test of Orthene against the larch casebearer. Research Note INT-226. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT 84401.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: Patrick Shea
 Mailing Address: USDA Forest Service
 2121C Second Street
 Davis, CA 95616
 *

PROJECT LOCATION

Project Location:	Adams	ID
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 675 AC

PROJECT DATES

1977 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Reldan	Chlorpyrifos-methyl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Field test efficacy of Reldan against western spruce budworm.

Abstract:

In 1977 the USDA Forest Service conducted a research field test on the Payette National Forest, Idaho. The insecticide Reldan was field tested against an outbreak population of the western spruce budworm. Reldan was applied at the rate of 8 oz, 4 oz, and 2 oz a.i./gal of diesel fuel with 3.8 grams of Rhodamine Extra Base dye and 99 cc of oleic acid (used as a carrier for the dye) added/gal as a marking agent. Application was by a Bell 47GB3 helicopter equipped with 19 8002 flat fan nozzle tips.

Project Publications and Reports:

Markin, G.P. and D.G. Grimble. 1977. Field test of the insecticide Reldan against the western spruce budworm in the Payette National Forest, Idaho. Final Report on file with Patrick Shea.

Markin, G.P. and D.G. Grimble. 1982. Reldan insecticide field-tested on western spruce budworm, Payette National Forest, Idaho, 1977. Research Note PSW-361. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: *
 Mailing Address: *

*
 *

TARGET PEST

Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location: Kamloops, B.C. CAN
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Number of treated acres within project boundary:
 450 AC

Chemical

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Southwest Station
 Project Director: George P. Markin
 Mailing Address: USDA Forest Service
 Institute of Pac. Islands
 1151 Punchbowl St., Rm 323
 Honolulu, HI 96813

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Meagher	MT
*	*	
*	*	
(County)	(State)	

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Pounce	Permethrin
Imidan	Phosmet
IGR	BAY SIR 8514
(brand name)	(common name)

Number of treated acres within project boundary:
 900 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1979 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To test the effectiveness of various application rates of three insecticides (permethrin, phosmet, and BAY SIR 8514) against western spruce budworm.

Abstract:

In 1979 the USDA Forest Service conducted aerial field tests in Meagher County, Montana, to test the effectiveness of various application rates of the insecticides permethrin, phosmet, and BAY SIR 8514 against western spruce budworm. All materials were applied by either a Bell 47 or Hiller 12E helicopter equipped with 8002 Spraying Systems flat fan tips.

Project Publications and Reports:

Markin, G.P. and D.R. Johnson. 1986. Aerial field tests of five insecticides on western spruce budworm in Idaho and Montana, 1978-1980. Research Note PSW-385. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: Pacific Southwest Station
Mailing Address: George P. Markin
USDA Forest Service
Institute of Pac. Islands
1151 Punchbowl St., Rm 323
Honolulu, HI 96813

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Adams ID
* *
* *
(County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Imidan	Phosmet
Bolstar	Sulprofos
IGR	BAY SIR 8514
(brand name)	(common name)

Number of treated acres within project boundary:
900 AC

TYPE OF APPLICATION

Diluted

PROJECT DATES

1980 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

To test the effectiveness of various application rates of three insecticides (phosmet, Sulprofos, and BAY SIR 8514) against western spruce budworm.

Abstract:

In 1980 the USDA Forest Service conducted aerial field tests in Adams County, Idaho, to test the effectiveness of various application rates of the insecticides phosmet, sulprofos, and BAY SIR 8514 against western spruce budworm. All materials were applied by either a Bell 47 or Hiller 12E helicopter equipped with 8002 Spraying Systems flat fan tips.

Project Publications and Reports:

Markin, G.P. and D.R. Johnson. 1986. Aerial field tests of five insecticides on western spruce budworm in Idaho and Montana, 1978-1980. Research Note PSW-385. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Canadian Forestry Service
 Agency:
 Project Director:
 Mailing Address:
 *
 *
 *
 *

TARGET PEST
 Douglas-Fir Tussock Moth

PROJECT LOCATION

Project Location: Kamloops, B.C. CAN
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE
 Biological
 Pesticide Name
 Virtuss NPV
 * *
 * *
 (brand name) (common name)

Number of treated acres within project boundary:
 100 AC

TYPE OF APPLICATION
 Diluted

PROJECT DATES

1982 (year)

TYPE OF AIRCRAFT
 Fixed-Wing

PROJECT CLASSIFICATION

Research Field Project

SPRAY SYSTEM
 Hydraulic Nozzles

Project Objectives:

(1) To compare an emulsifiable oil tank mix with an aqueous tank mix and (2) to test reduced dosages of virus in the oil tank mix in an effort to reduce treatment costs.

Abstract:

In 1982 four 10-ha plots located in Kamloops Forest District, British Columbia, containing Douglas-fir trees infested with Douglas-fir tussock moth were aerially sprayed with nuclear polyhedrosis virus (Virtuss) when most larvae were in the first instar. Two different tank mixes (1 water mix and 1 oil mix) were applied using a Cessna Agwagon fitted with 42 TeeJets with 8005 nozzles. Rhodamine B dye at 0.04% was added to all tank mixes to monitor spray deposit. The tests were conducted by the Canadian Forestry Service.

Project Publications and Reports:

Otvos, I.S., J.C. Cunningham, and L.M. Friskie. 1987. Aerial application of nuclear polyhedrosis virus against Douglas-fir tussock moth, Orgyia pseudotsugata (McDunnough) (Lepidoptera:Lymantriidae): I. Impact in the year of application. Can. Ent. 119:697-706.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Stetson Edmunds
 Mailing Address: Carson National Forest
 P.O. Box 558
 Taos, NM 87571
 *

PROJECT LOCATION

Project Location:	Taos	NM
*	*	*
*	*	*
(County)	(State)	

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological		
Pesticide Name	Dipel 6L	<u>Bacillus thuringiensis</u>
*	*	*
*	*	*
(brand name)		(common name)

Number of treated acres within project boundary:
 2,800 AC

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz	
Amount of Active Ingredient Applied	
	Per Acre: 12 BIU's

PROJECT DATES

1986 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Abstract:

In 1986 the USDA Forest Service conducted an aerial spray project on the Carson National Forest, Taos County, NM, against the western spruce budworm. Bacillus thuringiensis (Dipel 6L) was applied at 64 oz/acre (12 BIU's a.i./acre) to 2,800 acres using fixed-wing aircraft equipped with hydraulic nozzles.

Project Publications and Reports:

Rogers, T.J. Western spruce budworm suppression project using Bacillus thuringiensis - 1986, Carson National Forest, New Mexico. Letter summary. USDA Forest Service, Southwestern Region, State and Private Forestry, Forest Pest Management, Albuquerque, NM.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Southwestern Region
 Project Director: Stetson Edmunds
 Mailing Address: Carson National Forest
 P.O. Box 558
 Taos, NM 87571
 *

PROJECT LOCATION

Project Location:	Taos	NM
*	*	*
*	*	*
(County)	(State)	

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological		
Pesticide Name	Dipel 6L	<u>Bacillus thuringiensis</u>
	*	*
	*	*
	(brand name)	(common name)

Number of treated acres within project boundary:
 6,000 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 43 oz	
Amount of Active Ingredient Applied	
	Per Acre: 16 BIU's

PROJECT DATES

1987 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

1. To reduce western spruce budworm larvae to 5 or fewer larvae per 100 buds.
 2. To minimize western spruce budworm defoliation damages along the Rio Pueblo visual corridor.
-

Abstract:

In 1987 an aerial spray project was conducted by the USDA Forest Service on the Carson National Forest, Taos County, New Mexico against western spruce budworm. Approximately 6,000 acres were treated with Bacillus thuringiensis (Dipel 6L) using helicopters equipped with rotary atomizers. Application rate was 43 oz/acre (16 BIU's a.i./acre).

Project Publications and Reports:

In preparation.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Utah State Dept. of Ag.
Agency: *

Project Director: Van Burgess
Mailing Address: Utah State Dept. of Ag.
350 North Redwood Road
Salt Lake City, UT 84116
*

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location: Utah UT
Davis UT
Salt Lake UT
(County) (State)

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Foray 48B	*
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
20,064 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz
Amount of Active Ingredient Applied
Per Acre: 24 BIU's

1990 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To eradicate the gypsy moth from Utah, Davis, and Salt Lake Counties, UT.

Abstract:

In 1990 an aerial spray project was conducted to eradicate gypsy moth in Utah, Davis, and Salt Lake Counties, UT. The eradication project started in 1988 upon catching gypsy moth in pheromone traps. Approximately 1,200 acres were treated in 1989. In 1990 approximately 20,000 acres were treated with three applications of Bacillus thuringiensis (Foray 48B) applied at 64 oz/acre (24 BIU's). Two Bell 206B-III's and one Hiller 12E Soloy each equipped with four Beecomist rotary atomizers were used to apply the insecticide. In both years treatment was very successful reducing the catch numbers in the treated area by 95 percent.

Project Publications and Reports:

Munson, S. 1990. Utah gypsy moth eradication program - 1990 gypsy moth report. USDA Forest Service, Forest Pest Management, Ogden, UT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: Idaho Department of Lands
*
Project Director: R. Ladd Livingston
Mailing Address: Idaho Department of Lands
P.O. Box 670
Coeur d'Alene, ID 83814
*

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location: Kootenai ID
Bonner ID
*
(County) (State)

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Foray 48B	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
1,060 AC

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 96 oz
Amount of Active Ingredient Applied
Per Acre: 18 BIU's

PROJECT DATES

1990 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication.

Abstract:

In 1990 the Idaho Department of Lands treated 1,060 acres in Kootenai and Bonner Counties, Idaho for eradication of gypsy moth. Treatments consisted of aerial spraying of Bacillus thuringiensis (Foray 48B) applied three times and mass trapping using 3268 pheromone baited sticky traps deployed at either five or nine traps per acre. No moths were caught in the treated areas in 1990.

Project Publications and Reports:

Eggleston, J.E., and R.L. Livingston. 1991. Gypsy moth eradication program in Idaho - 1990. Report No. I&D 91-2. State of Idaho, Department of Lands, Bureau of Private Forestry, Insect and Disease Section, Coeur d'Alene, ID.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: Idaho Department of Lands
*
Project Director: R. Ladd Livingston
Mailing Address: Idaho Department of Lands
P.O. Box 670
Coeur d'Alene, ID 83814
*

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location: Bonner ID
Kootenai ID
* *
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 8L
*
*
(brand name) Bacillus thuringiensis
*
*
(common name)

Number of treated acres within project boundary:
380 AC

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 96 oz
Amount of Active Ingredient Applied
Per Acre: 16 BIU's

PROJECT DATES

1989 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication.

Abstract:

In 1989 the Idaho Department of Lands with cooperation from USDA Forest Service and USDA APHIS conducted a gypsy moth eradication project in northern Idaho. Approximately 110 acres in Coeur d'Alene and 270 acres in Sandpoint were treated with Bacillus thuringiensis (Dipel 8L). Each site received three aerial applications of B.t. at 7 to 10 day intervals. Application rate was 96 oz/acre (16 BIU's a.i./acre). A mass trapping program was implemented as a follow-up to the insecticide treatment using a trap density of 9 per acre.

Project Publications and Reports:

Tisdale, R. and R.L. Livingston. 1990. Gypsy moth eradication program in Idaho - 1989. IDL Report No. 90-4. State of Idaho, Department of Lands, Coeur d'Alene, ID.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Idaho Department of Lands
 Agency: *

Project Director: R. Ladd Livingston

Mailing Address: Idaho Department of Lands
 P.O. Box 670
 Coeur d'Alene, ID 83814
 *

PROJECT LOCATION

Project Location: Benewah ID
 * *
 * *
 (County) (State)

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Chemical	
Pesticide Name	Carbaryl
Sevin 4-Oil	*
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 1 gal	
Amount of Active Ingredient Applied	
Per Acre: 1 lb	

PROJECT DATES

1973 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Hydraulic Nozzles

Project Objectives:

Testing of alternate to DDT.

Abstract:

In 1973 the Idaho Department of Lands conducted a research field test in northern Idaho. Sevin 4-Oil carbamate pesticide was applied aerially at an application rate of 1 gal/acre (1 lb a.i./acre) as a control for the Douglas-fir tussock moth. The project was a test to find an alternate to DDT the only registered pesticide at that time. Populations were sampled before spraying and at 3, 9, and 16 days post-spray. The average corrected population reduction was 65.5 percent. Foliage was protected.

Project Publications and Reports:

Livingston, R.L. 1973. 1973 test of Sevin 4-oil for control of the Douglas-fir tussock moth. Forest Pest Report No. 3. State of Idaho, Department of Lands, Coeur d'Alene, ID.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Agency: Yakima Indian Nation
 Project Director: Jim Hadfield
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location:	Yakima	WA
	Klickitat	WA
	*	*
	(County)	(State)

SELECTED INSECTICIDE

Biological		
Pesticide Name		
Thuricide 48LV	<u>Bacillus thuringiensis</u>	
*	*	
*	*	
(brand name)	(common name)	

Number of treated acres within project boundary:
 70,827 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 1/3 gal	
Amount of Active Ingredient Applied	
	Per Acre: 16 BIU's

PROJECT DATES

1990 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Operational suppression of western spruce budworm.

Abstract:

The USDA Forest Service, USDI Bureau of Indian Affairs and the Yakima Indian Nation Tribal Council carried out a project to suppress an outbreak of western spruce budworm on the Yakima Indian Reservation in central Washington. Thuricide 48LV, a biological insecticide using Bacillus thuringiensis variety Kurstaki as the active ingredient, was applied undiluted at the rate of 1/3 gal/acre to 70,827 acres. Application was made by helicopters and single engine planes equipped with rotary atomizers. The project area was divided into three analysis units, with 61 spray blocks. Early larval densities prior to spraying averaged 27.2, 29.3 and 24.3 budworms per 45 cm mid-crown branch tip for the Signal Peak, Simcoe West and Simcoe East analysis units, respectively. Post-spray population densities averaged 1.7, 5.0, and 2.4 budworms per three 45 cm lower-crown branch tips for the Signal Peak, Simcoe West, and Simcoe East analysis units. Cost for the treatment was \$15.35 per acre.

Project Publications and Reports:

Anonymous. [no date]. 1990 Yakima Indian Reservation western spruce budworm suppression project. Forest Pest Management Project Report. USDA Forest Service, Pacific Northwest Region, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION		TARGET PEST
Lead Company or Agency:	Washington Dept. of Ag. *	Gypsy Moth
Project Director:	Eric Lagasa	
Mailing Address:	Washington Dept. of Ag. 406 General Adm. Bldg. MS:AX-41 Olympia, WA 98504	
PROJECT LOCATION		SELECTED INSECTICIDE
Project Location:	Clark * *(County)	WA * (State)
		Biological Pesticide Name Foray 48B * *(brand name)
		<u>Bacillus thuringiensis</u> * *(common name)
Number of treated acres within project boundary: 300 AC		TYPE OF APPLICATION Diluted
		APPLICATION RATE Volume Applied Per Acre: 1 gal Amount of Active Ingredient Applied Per Acre: 24 BIU's
PROJECT DATES	1990 (year)	TYPE OF AIRCRAFT Rotary-Wing
PROJECT CLASSIFICATION	Operational Project	SPRAY SYSTEM Hydraulic Nozzles

Project Objectives:

Eradicate gypsy moth introduction.

Abstract:

In 1990 the Washington Department of Agriculture conducted an aerial spray project in Clark County, Washington to eradicate gypsy moth. Approximately 300 acres were treated with Bacillus thuringiensis (Foray 48B) at an application rate of 1 gal/acre (24 BIU's) using a helicopter equipped with hydraulic nozzles.

Project Publications and Reports:

EA, In-house summary report.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: Boise Cascade Corporation
 Project Director: Richard Johnson
 Mailing Address: Boise Cascade Corporation
 Box 106
 Goldendale, WA
 *

PROJECT LOCATION

Project Location: Klickitat WA
 * *
 * *
 (County) (State)

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4-Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz	
Amount of Active Ingredient Applied	
Per Acre: 1 lb	

PROJECT DATES

1990 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Suppress western spruce budworm populations.

Abstract:

In 1990 Boise Cascade Corporation conducted a western spruce budworm suppression project in Klickitat County, Washington. Approximately 3,960 acres were treated with carbaryl (Sevin 4-Oil). Application was made using rotary wing aircraft equipped with rotary atomizers. A 96.5 percent mortality was achieved.

Project Publications and Reports:

Internal report only.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Station
 Project Director: Roy Beckwith
 Mailing Address: Forest Sciences Laboratory
 3200 Jefferson Way
 Corvallis, OR 97331
 *

PROJECT LOCATION

Project Location:	Elmore	ID
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 400 AC

PROJECT DATES

1991 (year)

PROJECT CLASSIFICATION

Research Field Test

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Biological	
Pesticide Name	
NPV	TM Biocontrol-1
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 1 gal	
Amount of Active Ingredient Applied	
Per Acre: .29 grams on	
200 acres and .15 grams on 200 acres	

TYPE OF AIRCRAFT

Rotary-Wing

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Determine post-spray population density changes as a result of aerial treatment with different dosages of TM Biocontrol-1.

Determine the short-term persistence of the NPV on coniferous foliage under natural field conditions.

Determine any long-term persistence of the NPV in the soil.

Abstract:

Project Publications and Reports:

None until analyses are complete -- basically a 2-year project.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or Utah State Dept. of Ag.
Agency: *

Project Director: Van Burgess
Mailing Address: Utah State Dept. of Ag.
350 N. Redwood Road
Salt Lake City, UT 84116
*

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location:	Wasatch, Davis	UT
	Salt Lake, Utah	UT
	Summit	UT
	(County)	(State)

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	*
Foray 48B	*
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
29,925 AC
(Treated 3 times)

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 1/2 gal
Amount of Active Ingredient Applied
Per Acre: 24 BIU's

PROJECT DATES

1991 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication of gypsy moth from Utah.

Abstract:

This was the third year that aerial treatment was required to reduce gypsy moth populations in Northern Utah. In 1988, two viable gypsy moth populations were found in a residential area of Salt Lake City. As a result, 1,198 acres were treated in 1989 with three aerial applications of Bacillus thuringiensis (Bt). There was a 95% and 98% reduction in larval and eggmass counts respectively. An intensive trapping program was initiated in 1989 along the Wasatch Front to further delimit and locate gypsy moth populations. As a result of the expanded trapping, new moth populations were located and 13 blocks, encompassing 20,064 acres, were treated in 1990. There was a 90% reduction in male moth catches within the treatment blocks. The trapping effort was expanded in 1990 which resulted in additional male moth captures in previously untrapped areas. The treatment areas for 1991 consisted of 14 spray blocks, in five counties, encompassing 29,925 acres.

Project Publications and Reports:

Anhold, J. 1991. Utah gypsy moth eradication program - 1991 gypsy moth project report. USDA Forest Service, Forest Pest Management, Ogden, UT.

Barry, J.W. and M.E. Teske. 1992. Predicting and observing fate of sprays released over forests. Presented at the XIX international congress of entomology, Beijing, China, July 2, 1992, at session 14S-5, "The Fate of Chemicals in the Environment."

Barry, J.W., M.E. Teske, J.A. Rafferty, B.S. Grim and P.J. Skyler. 1992. Predicting drift in complex terrain. Paper No. 921085. ASAE international summer meeting. Charlotte, NC.

Curbishley, T. 1992. 1991 CASPR spray aircraft efficiency model - validation study. FPM 92-8 (C.D.I. Technical Note No. 91-10). Prepared under contract 53-0343-1-00153 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Pest Management, Davis, CA.

Curbishley, T.B., M.E. Teske, and J.W. Barry. 1993. Validation of the CASPR aerial spray efficiency model. Applied Engineering in Agriculture, Vol. 9(2):199-203.

Grim, B., J. Rafferty, G. Sutton and T. Clarke. 1992. Deposition of Bacillus thuringiensis into Gambel oak canopies. FPM 92-9. U.S. Army Dugway Proving Ground, Utah in cooperation with USDA Forest Service, Forest Pest Management, Davis, CA.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific Northwest Region
 Project Director: Jim Hadfield
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

PROJECT LOCATION

Project Location:	Baker	OR
*	*	*
*	*	*
(County)	(State)	

Number of treated acres within project boundary:
 116,064 AC

TARGET PEST

Douglas-Fir Tussock Moth

SELECTED INSECTICIDE

Biological		
Pesticide Name		
Thuricide 48LV		<u>Bacillus thuringiensis</u>
*		*
*		*
(brand name)		(common name)

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 42.7 oz	
Amount of Active Ingredient Applied	
	Per Acre: 16 BIU's

PROJECT DATES

1991 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Reduce Douglas-fir tussock moth population by 80 percent.

Abstract:

Project Publications and Reports:

Being prepared.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or UC Davis, Entotech, Inc. &
 Agency: USDA Forest Service
 Project Director: Frank Zalom
 Mailing Address: Integrated Pest Mgt.
 Univ. of California
 Davis, CA 95616
 *

TARGET PEST

Peach Twig Borer

PROJECT LOCATION

Project Location:	Colusa	CA
*	*	*
*	*	*
(County)	(State)	

SELECTED INSECTICIDE

Biological		
Pesticide Name		<u>Bacillus thuringiensis</u>
Biobit XL 48B		*
*		*
*		*
(brand name)		(common name)

Number of treated acres within project boundary:
 30 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 1/2 gal.	
Amount of Active Ingredient Applied	
	Per Acre: 24 BIU's

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Fixed-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To determine efficacy of Bacillus thuringiensis (Bt) applied by aircraft to control peach twig borer on almond trees.

Abstract:

Early spring, ultra-low volume application of Bt was studied to assess spray distribution and efficacy against the peach twig borer (Anarsia lineatella). A 16.7 ha almond orchard was divided into 4 blocks, whereby 2 blocks received an aerial application of Bt, and the other 2 blocks served as untreated checks. Kromekote cards and polyethylene soda straws were located in tree canopies and on the ground to monitor spray droplet distribution during February and March 1992 applications. Little drift onto trees in untreated check rows adjacent to treated sections occurred. Within a given tree, spray droplet densities varied considerably among canopy regions, and even on a small spacial scale within a given region. Mean droplet densities were generally greater in the top portion of the canopy. However, densities varied considerably from February to March applications relative to tree top and ground level locations. Mean droplet densities were far more consistent at mid-canopy locations throughout the study. A trend toward reduced peach twig borer damage was noted in treated (3.8 strikes per tree) vs check (8.9 strikes per tree) sections.

Project Publications and Reports:

Barry, J.W., M.E. Teske, B.S. Grim, W.J. Roltsch, and F.G.Zalom. 1993. Observing and predicting spray penetration in tree canopies. ASAE Paper No. 931060. Presented at the ASAE and CSAE 1993 international summer meeting. Spokane, WA, 20-23 June.

Teske, M.E., J.W. Barry, P.J. Skyler, F.G. Zalom, and G.W. Kirfman. 1993. FSCBG application to canopy spray penetration and deposition. ASAE Paper No. 931062. Presented at the ASAE and CSAE 1993 international summer meeting. Spokane, WA, 20-23 June.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
 Agency: *
 Project Director: Steve Howes
 Mailing Address: Wallowa-Whitman NF
 P.O. Box 907
 Baker City, OR 97814
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Wallowa OR
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u>
Pesticide Name	
Thuricide 48LV	
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 70,222 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz
Amount of Active Ingredient Applied
Per Acre: 24 BIU's

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Safely, efficiently and economically reduce the western spruce budworm population within the treatment units to levels that would not cause additional, unacceptable resource damage for several years. Reduce western spruce budworm population by 90 percent, unadjusted for natural mortality.

Abstract:

In 1992 the USDA Forest Service conducted an aerial spray project against the western spruce budworm in Wallowa County, Oregon. Approximately 70,222 acres were treated with Bacillus thuringiensis (Thuricide 48LV). Application was made using both fixed and rotary wing aircraft. Application rate was 64 oz per acre (24 BIU's a.i./acre). Populations of western spruce budworm were reduced by 87 and 90 percent within the two treatment units. Per acre treatment cost was \$17.22. There were no accidents.

Project Publications and Reports:

Howe, S. and D. Wallesz. 1992. Umatilla and Wallowa-Whitman national forests western spruce budworm suppression project - Wallowa Valley Ranger District. USDA Forest Service, Pacific Northwest Region, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or
Agency: USDA Forest Service
 *
 Project Director: Jim Hadfield
 Mailing Address: USDA Forest Service
 Forest Pest Management
 P.O. Box 3623
 Portland, OR 97208

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Union OR
 Umatilla OR
 Columbia WA
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Thuricide 48LV
 *
 *
 (brand name) Bacillus thuringiensis
 *
 *
 (common name)

Number of treated acres within project boundary:
 116,344 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz
 Amount of Active Ingredient Applied
 Per Acre: 24 BIU's

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Both

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Safely, efficiently and economically reduce the western spruce budworm population within the treatment areas to levels that would not cause additional unacceptable resource damage for several years. Reduce western spruce budworm population by 90 percent, unadjusted for natural mortality.

Abstract:

In 1992 the USDA Forest Service conducted an aerial spray project against the western spruce budworm in Union and Umatilla Counties, Oregon and in Columbia County, Washington. Approximately 116,344 acres were treated with Bacillus thuringiensis (Thuricide 48LV). Application was made using both rotary and fixed wing aircraft. Application rate was 64 oz/acre (24 BIU's a.i./acre). Populations of western spruce budworm were reduced by 79 to 87 percent in five treatment units. Per acre cost was \$16.88. There were no accidents.

Project Publications and Reports:

Hadfield, J. S. 1993. 1992 Umatilla and Wallowa-Whitman national forests western spruce budworm suppression project. USDA Forest Service, Pacific Northwest Region, Forest Pest Management, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Non-Industrial Private
Agency: Landowners
Project Director: *
Mailing Address:
*
*
*

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Umatilla OR
Union OR
Wallowa OR
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 6AF
Thuricide 48LV
*
(brand name) Bacillus thuringiensis
Bacillus thuringiensis
*
(common name)

Number of treated acres within project boundary:
4,338 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: *
Amount of Active Ingredient Applied
Per Acre: *

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted in Umatilla, Union and Wallowa Counties, Oregon against the western spruce budworm. Approximately 4,338 acres were treated with Bacillus thuringiensis (Dipel 6AF and Thuricide 48LV). Application was made using rotary wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: * Non-Industrial Private
Project Director: * Landowners
Mailing Address:
*
*
*

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Umatilla OR
Union OR
Wallowa OR
(County) (State)

SELECTED INSECTICIDE

Chemical	
Pesticide Name	Carbaryl
Sevin 4-Oil	
*	*
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
7,297 AC

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre:*	
Amount of Active Ingredient Applied	
Per Acre:*	

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted in Umatilla, Union and Wallowa Counties, Oregon against the western spruce budworm. Approximately 7,297 acres were treated with carbaryl (Sevin 4-oil). Application was made using rotary-wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Willamette Industries
 Agency: *
 Project Director: *
 Mailing Address: P.O. Box 907
 Albany, OR 97321
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Deschutes OR
 * *
 * *
 (County) (State)

SELECTED INSECTICIDE

Both	
Pesticide Name	
Sevin 4-Oil	Carbaryl
Thuricide 48LV	<u>Bacillus thuringiensis</u>
*	*
(brand name)	(common name)

Number of treated acres within project boundary:
 6,149 AC

TYPE OF APPLICATION

Both

APPLICATION RATE

Volume Applied Per Acre:*	
Amount of Active Ingredient Applied	
Per Acre:*	

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted by Willamette Industries in Deschutes County, Oregon against the western spruce budworm. Approximately 5,500 acres were treated with carbaryl (Sevin-4 oil) and 649 acres were treated with Bacillus thuringiensis (Thuricide 48LV). Application was made using rotary wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or Boise Cascade Corporation
 Agency: *
 Project Director: *
 Mailing Address: 1917 Jackson
 La Grande, OR 97850
 *
 *

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Union OR
 Wallowa OR
 * *
 (County) (State)

SELECTED INSECTICIDE

Both	Carbaryl
Pesticide Name	<u>Bacillus thuringiensis</u>
Sevin 4-Oil	*
Dipel 6AF	
*	
(brand name)	(common name)

Number of treated acres within project boundary:
 28,897 AC

TYPE OF APPLICATION

Both

APPLICATION RATE

Volume Applied Per Acre:*	
Amount of Active Ingredient Applied	
Per Acre:*	

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted by Boise Cascade Corporation in Union and Wallowa Counties, Oregon against the western spruce budworm. Approximately 25,897 acres were treated with carbaryl (Sevin 4-Oil) and 3,000 acres treated with Bacillus thuringiensis (Dipel 6AF) using rotary wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or Agency:	Louisiana Pacific
Project Director:	*
Mailing Address:	P.O. Drawer AA
	Pilot Rock, OR 97868
	*
	*

PROJECT LOCATION

Project Location: Umatilla OR
* *
* *
(County) (State)

Number of treated acres within project boundary:
3.279 AC

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: *
Amount of Active Ingredient Applied
Per Acre: *

PROJECT DATES 1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted by Louisiana Pacific in Umatilla County, Oregon against the western spruce budworm. Approximately 3,279 acres were treated with Bacillus thuringiensis (Dipel 6AF) using rotary wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS**ADMINISTRATION**

Lead Company or
Agency:
*
Project Director:
*
Mailing Address:
525 State Street, SE
Salem, Oregon 97310
*
*

TARGET PEST

Western Spruce Budworm

PROJECT LOCATION

Project Location: Wallowa OR
* *
* *
(County) (State)

SELECTED INSECTICIDE

Biological
Pesticide Name
Thuricide 48LV
*
*
(brand name) Bacillus thuringiensis
(common name)

Number of treated acres within project boundary:
200 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: *
Amount of Active Ingredient Applied
Per Acre: *

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Abstract:

In 1992 an aerial spray project was conducted in Wallowa County, Oregon against the western spruce budworm. Approximately 200 acres were treated with Bacillus thuringiensis (Thuricide 48LV) using rotary wing aircraft equipped with rotary atomizers.

Project Publications and Reports:

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or USDA Forest Service
Agency: *

Project Director: Julie Weatherby
Mailing Address: USDA Forest Service
Forest Pest Management
1750 Front Street, Room 202
Boise, ID 83702

PROJECT LOCATION

Project Location: Washington ID
* *
* *
(County) (State)

Number of treated acres within project boundary:
600 AC

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Biological	
Pesticide Name	
No-Mate	2-6 Heneicosen-11-one
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 100 grams
Amount of Active Ingredient Applied
Per Acre: 10 grams

PROJECT DATES

1991 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Pilot Test

SPRAY SYSTEM - Other (specialized application system
for hollow fiber application)

Project Objectives:

To demonstrate the feasibility of using the mating disruption technique to control douglas-fir tussock moth.

To determine the effect on selected non-target arthropods.

Abstract:

Six 200-acre plots were established in the Hitt Mountains, Weiser Road, Payette National Forest. DFTM Pheromone loaded in center sealed fibers and mixed with a sticker was applied via helicopter to 3 plots in August 1991. Treatment reduced the next year's DFTM larval population by 81% in treated versus check plots. Treatment had no measurable effect on carpenter ants, western spruce budworm, or spiders.

Project Publications and Reports:

(Manuscript in preparation)

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Project Director: *
Mailing Address: Roy Beckwith
USDA Forest Service
Forestry Sciences Lab
3200 Jefferson Way
Corvallis, OR 97331

PROJECT LOCATION

Project Location:	Elmore	ID
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
400 AC

TARGET PEST

Douglas-fir Tussock Moth

SELECTED INSECTICIDE

Biological		
Pesticide Name		
TM Biocontrol-1	NPV	
*	*	
*	*	
(brand name)	(common name)	

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 1 gal.		
Amount of Active Ingredient Applied		
Per Acre: .5 grams.		
.25 grams		

PROJECT DATES

1991 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To compare different dosages of TM Biocontrol-1 while holding the spray volume constant.

Abstract:

A TM Biocontrol-1 rate study was conducted on the Boise National Forest near Featherville, Idaho. The treatments consisted of applications of the labelled rate, 1/2 labelled rate, and a no treatment control. Five replications of each treatment were applied. Pre-treatment larval populations were sampled using lower crown beating techniques. Post-treatment larval samples were completed 20 days after treatment. Applications were completed during early July. No significant difference was found between the two application rates and the control.

Project Publications and Reports:

(Manuscript in preparation)

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA APHIS
 Agency: *
 Project Director: Gary Smith
 Mailing Address: USDA-APHIS, PPQ
 511 NW Broadway, Rm 657
 Portland, OR 97209
 *

PROJECT LOCATION

Project Location:	Multnomah	OR
	Pierce	WA
	King	WA
	(County)	(State)

Number of treated acres within project boundary:
 370,374 AC

TARGET PEST

Asian Gypsy Moth

SELECTED INSECTICIDE

Biological	<u>Bacillus thuringiensis</u> * * (brand name)
Pesticide Name	
Foray 48B	
(common name)	

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz
Amount of Active Ingredient Applied
Per Acre: 24 BIU's

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication of Asian gypsy moth populations.

Abstract:

Ten adult moths caught in pheromone traps in 1991. No other life stages detected on land. Egg masses found on ships arriving from Far East (Russia). Project was conducted by APHIS, Forest Service, Oregon Department of Agriculture and Washington Department of Agriculture. Three aerial applications of B.t. 10-7 days apart. No Asian adults caught in 1992.

Project Publications and Reports:

(Asian Gypsy Moth Eradication Project. Report prepared by Incident Management Team, not published - limited copies available from Region 6, Forest Pest Management, Portland, OR.)

Mudge, A.D. and K.J.R. Johnson. 1992. Gypsy moth in Oregon - Gypsy moth detection, eradication, and exclusion programs in Oregon. Prepared for national gypsy moth review, Indianapolis, IN. 2-5 November.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or
Agency: USDI-Bureau of Indian
Affairs (Warm Springs)
Project Director: Jim Hadfield
Mailing Address: USDA Forest Service
Forest Pest Management
P.O. Box 3623
Portland, OR 97208

PROJECT LOCATION

Project Location:	Jefferson Wasco	OR OR
	(County)	(State)

Number of treated acres within project boundary:
64,182 AC

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological	
Pesticide Name	<u>Dipel 6AF</u>
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: 0.5 gal/ac
Amount of Active Ingredient Applied
Per Acre: 24 BIU/ac

PROJECT DATES

1993 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

To reduce the budworm larval populations by 90 percent, unadjusted for natural mortality, in the time period between pre-treatment and post-treatment sampling (which occurs 14 to 21 days after treatment). The goal was to reduce budworm populations within the project area to levels that would not cause unacceptable effects on resources for several years.

Abstract:

Acres treated with insecticides in each analysis unit were 17,804 in Badger Butte (BAB); 22,842 in Lionshead (LIO); and 23,536 in Mt. Wilson (MTW). Mean pre-treatment and post-treatment larval population densities per tree (three 18-in lower crown branches) and standard errors of the means were: 10.0 ± 1.4 and 0.7 ± 0.1 for BAB; 5.1 ± 0.6 and 0.3 ± 0.1 for LIO; and 4.3 ± 0.8 and 0.6 ± 0.2 for MTW. Only one unit (BAB) had populations high enough to qualify for treatment under guidelines used for lands managed by the Pacific Northwest Region, USDA Forest Service. However, BIA officials believed that populations could resurge quickly without treatment and would cause unacceptable effects, and that treatment offered the potential for reducing and keeping populations at acceptable levels for several years. Population reduction percentages (uncorrected for natural mortality) for midcrown budworm density estimates per 18-in midcrown branch (derived from lower crown estimates) were 89, 87, and 76 for BAB, LIO, and MTW, respectively.

Project Publications and Reports:

Hadfield, J. S. [no date]. 1993 Warm Springs Indian Reservation western spruce budworm suppression project. Forest Pest Management Project Report. USDA Forest Service, Pacific Northwest Region, Portland, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or
Agency: USDA Forest Service
Southwestern Region
Project Director:
Mailing Address: Carson National Forest
P.O. Box 558
Taos, NM 87571
*

PROJECT LOCATION

Project Location:	Taos	NM
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
2,790 AC

PROJECT DATES

1986 (year)

PROJECT CLASSIFICATION

Operational Project

Project Objectives:

At the insistence of Save the Trees Committee of the Town of Red River the objective of this project was to aerially apply B.t. to 2,790 acres of mixed conifer host type near and adjacent to Red River to ensure the collapse of the western spruce budworm outbreak in and around Red River.

Abstract:

In 1986, the Carson National Forest in conjunction with Forest Pest Management, Southwestern Region, conducted a western spruce budworm (WSB) suppression project on forested lands within the Red River drainage, Questa Ranger District. A total of 2,790 acres of mixed conifer host type was treated with the bacterium, Bacillus thuringiensis. Dipel 6L was applied diluted at a 1:1 ratio with water and applied at a final volume of 64 ounces per acre. This volume gave a dosage rate of 12 BIU's per acre. A fixed-wing turbine engine aircraft (S 2R-T34/Ag Turbo Thrush) equipped with flat fan nozzles (No. 8020) with a swath of 200 feet was used to apply the insecticide. Application was made at 150 mph at 50 feet above the canopy.

Project Publications and Reports:

Rogers, T.J. 1994. 1986 western spruce budworm suppression project, Camino Real ranger district. Memorandum to the Record dated January 21, 1994. USDA Forest Service, Southwestern Region, Albuquerque, NM.

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TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological
Pesticide Name
Dipel 6L
*
*
(brand name)
Bacillus thuringiensis
*
*
(common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz/ac
Amount of Active Ingredient Applied
Per Acre: 12 BIU/ac

TYPE OF AIRCRAFT

Fixed-Wing

SPRAY SYSTEM

Hydraulic Nozzles

=====

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or Hood River County
 Agency: Department of Forestry
 Project Director: Ken Galloway
 Mailing Address: 918 18th Street
 Hood River, OR 97031
 *
 *

PROJECT LOCATION

Project Location:	Hood River	OR
*	*	
*	*	
(County)	(State)	

Number of treated acres within project boundary:
 2,530 AC

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Chemical	
Pesticide Name	
Sevin 4 Oil	Carbaryl
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 64 oz/ac	
Amount of Active Ingredient Applied	
Per Acre: 1 lb	

PROJECT DATES

1993 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Protect foliage on commercial timberland.

Abstract:

Project Publications and Reports:

None

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS

ADMINISTRATION

Lead Company or USDA Forest Service
 Agency: Pacific NW Research Station
 Project Director: D.G. Grimble
 Mailing Address: Forestry Sciences Lab
 3200 SW Jefferson Way
 Corvallis, OR 97330
 *

PROJECT LOCATION

Project Location: Union OR
 Umatilla OR
 *
 (County) (State)

Number of treated acres within project boundary:
 80 AC

TARGET PEST

Western Spruce Budworm

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Thuricide
 *
 *
 (brand name)
Bacillus thuringiensis
 *
 (common name)

TYPE OF APPLICATION

Diluted

APPLICATION RATE

Volume Applied Per Acre: 96 oz
 Amount of Active Ingredient Applied
 Per Acre: 16 BIU's

PROJECT DATES

1993 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Research Field Test

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

1. To determine species diversity and relative abundance of non-target Lepidoptera present in typical eastern Oregon mixed coniferous forests, with particular emphasis on species in larvae form at spray time;
 2. to evaluate the relative vulnerability of those species to Bt sprays, considering their lifestyles and biological characteristics.
-

Abstract:

To investigate the species of nocturnal non-target Lepidoptera present in eastern Oregon coniferous forests and the possible effects of Bacillus thuringiensis sprays on these non-targets, four plots were established in 1992. ULV blacklight traps were operated 3 nights per week from May 1 to October 1, in 1992, 1993 (and again in 1994). Trap collected moths were identified to species level. Larvae were collected from plants at spray time and reared to adults on foliage. Two plots were aerially sprayed in July 1993. To date, nearly 400 species of moths have been identified from trap collections, but no conclusions regarding possible effects of Bt spray are possible until follow-up (1994) trapping is complete.

Project Publications and Reports:

Grimble, D.G., R.C. Beckwith, P.C. Hammond. 1993. New Lepidoptera records for the Blue Mountains of eastern Oregon. PNW-RP-469. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Grimble, D.G. and R.C. Beckwith. 1993. Temporal presence of late instar Mitoura spinetorum (Lycaenidae) in eastern Oregon. J. Lepidopterists's Soc. 47(4):329-330.

Grimble, D.G., R.C. Beckwith, and P.C. Hammond. 1994. A survey of the Lepidoptera fauna from the Blue Mountains of eastern Oregon. J. Research on the Lepidoptera. (in press).

Grimble, D.G. [undated]. Impacts of Bacillus thuringiensis on nontarget Lepidoptera in western coniferous forests. NAPIAP Study No. PNW-43, Progress Report FY 1993. USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, Corvallis, OR.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEPOLIATORS

ADMINISTRATION

Lead Company or Utah Dept. of Agriculture
 Agency: *
 Project Director: Van Burgess
 Mailing Address: Utah Dept. of Agriculture
 350 N. Redwood Road
 Salt Lake City, UT 84410
 *

TARGET PEST

Gypsy Moth

PROJECT LOCATION

Project Location: Davis, Salt Lake UT
 Wasatch UT
 Utah UT
 (County) (State)

SELECTED INSECTICIDE

Biological
 Pesticide Name
 Thuricide 48LV
 *
 *
 (brand name) Bacillus thuringiensis
 *
 *
 (common name)

Number of treated acres within project boundary:
 15,718 AC

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: .5 gal.
 Amount of Active Ingredient Applied
 Per Acre: 24 BIU

PROJECT DATES

1992 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication of the gypsy moth from the State of Utah.

Abstract:

Aerial application of B.t. was applied over 6 treatment blocks, consisting of 15,718 acres within 4 counties. Each spray block was treated three times at 5-day intervals. A Hughes 500 and a Bell 206 B-III were used for application. Both aircraft were equipped with four electronic rotary atomizer Beeconomist nozzles, calibrated to deliver 64 oz. per acre. Thuricide 48LV, at 24 BIU's per acre (48 BIU's per gallon) was applied undiluted for each application. Application costs, which include the cost of the B.t. and aerial application only, was \$9.27 per acre.

Project Publications and Reports:

Whaley, W. 1993. A survey and monitoring of TES Lepidopteran species in the Utah 1992 and potential 1993 gypsy moth eradication area. USDA Forest Service, Forest Pest Management, Ogden, UT.

AERIAL INSECTICIDE PROJECTS FOR SUPPRESSION OF WESTERN DEFOLIATORS**ADMINISTRATION**

Lead Company or Utah Dept. of Agriculture
 Agency: *
 Project Director: Van Burgess
 Mailing Address: Utah Dept. of Agriculture
 350 N. Redwood Road
 Salt Lake City, UT 84110
 *

PROJECT LOCATION

Project Location:	Salt Lake	UT
	Wasatch	UT
	Utah	UT
	(County)	(State)

Number of treated acres within project boundary:
 5,135 AC

TARGET PEST

Gypsy Moth

SELECTED INSECTICIDE

Biological	
Pesticide Name	<u>Dipel 6AF</u>
*	*
*	*
(brand name)	(common name)

TYPE OF APPLICATION

Undiluted

APPLICATION RATE

Volume Applied Per Acre: .5 gal.
 Amount of Active Ingredient Applied
 Per Acre: 24 BIU's

PROJECT DATES

1993 (year)

TYPE OF AIRCRAFT

Rotary-Wing

PROJECT CLASSIFICATION

Operational Project

SPRAY SYSTEM

Rotary Atomizers

Project Objectives:

Eradication of the gypsy moth from the state of Utah.

Abstract:

Aerial application of B.t. was applied over 9 treatment blocks, consisting of 5,135 acres within three counties. Each spray block was treated three times at 5-day intervals. A Bell 206 B-III was used for application. The aircraft was equipped with four electronic rotary atomizer Beecomist nozzels, calibrated to deliver 64 oz per acre. Dipel 6AF, at 24 BIU's per acre (48 BIU's per gallon) was applied undiluted for each application. Application costs, which include the cost of the B.t. and aerial application only, was \$7.49 per acre.

Project Publications and Reports:

Whaley, W. 1994. The monitoring of sensitive Utah Lepidoptera during the gypsy moth eradication program, 1990 to 1993. USDA Forest Service, Forest Pest Management, Ogden, UT.

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